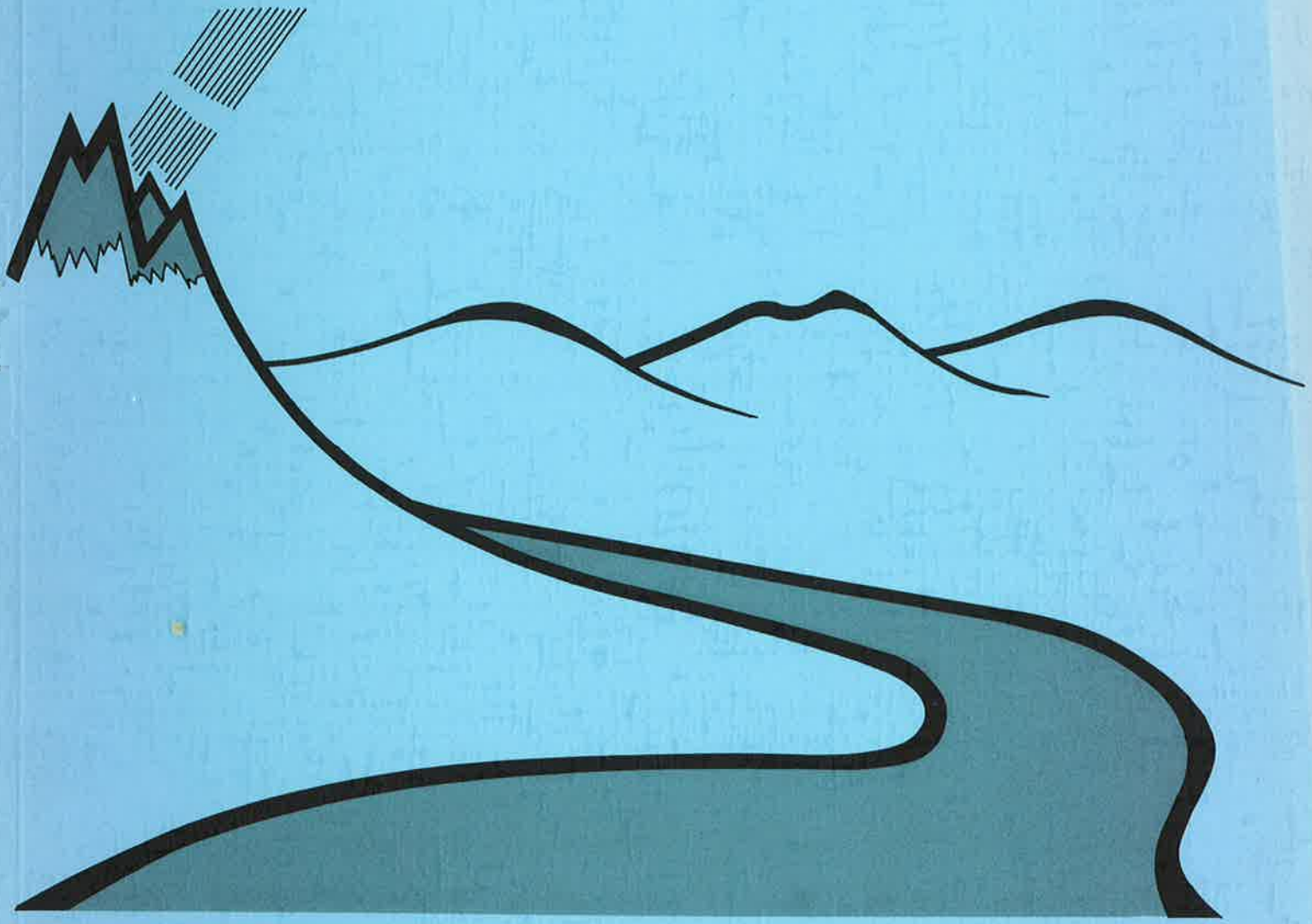
HYDROLOGY FIELD OFFICE PRACTICE

D A McMILLAN



PUBLICATION No 5 OF THE HYDROLOGY CENTRE CHRISTCHURCH

Publication no. 5 of the Hydrology Centre, Christchurch (1985)

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HYDROLOGY FIELD OFFICE PRACTICE

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Hydrology Centre, Ministry of Works and Development, Christchurch

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This handbook describes the current procedures used by Ministry of Works and Development for the capture and archiving of hydrological data. It also serves as an instructional guide to introduce hydrological field party staff to the hardware and software available to them for processing data in the field office.

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PREFACE

This handbook describes the current procedures used by the Ministry of Works and Development (MWD) for the capture of hydrological data. Applications of this data are primarily made using a mainframe computer to to which all data are transferred from field offices where it is captured on microcomputers. The equipping of field offices with microcomputers in 1982 has meant that it is now possible to more rapidly process data and to better maintain its quality.

Much of the content of section 1 of the handbook was determined with the assistance of field party leaders during an hydrology workshop held in Christchurch in November 1983. I would like to thank the participants at that meeting and the many other MWD staff who have contributed to this handbook.

Special thanks must go to Barbara Vaile for the many hours she has spent editing and consolidating this handbook into its present form.

D.A. McMILLAN
30 June 1985

Publication no. 5 of the Hydrology Centre, Chriistchurch (1985)

Publication no. 5 of the Hydrology Centre, Chriistchurch (1985)

TABLE OF CONTENTS

Publication no. 5 of the Hydrology Centre, Chriistchurch (1985)

LIST OF FIGURES

Publication no. 5 of the Hydrology Centre, Chriistchurch (1985)

LIST OF TABLES

Publication no. 5 of the Hydrology Centre, Chriistchurch (1985)

Publication no. 5 of the Hydrology Centre, Chriistchurch (1985)

INTRODUCTION

The Ministry of Works and Development (MWD) maintains 16 field parties throughout New Zealand to collect routine hydrological data, as well as install and service collection equipment. Data collected is stored in the national TIDEDA archive on the MWD mainframe computer facility at the Vogel Computer Centre (VCC), and is retrieved and analysed using the many different processes in the TIDEDA software (MWD 1982). The development from this software of micro-TIDEDA now means that data can be entered and corrected, virtually at the point it is collected, using ALTOS microcomputers and floppy disks.

The maintenance of the TIDEDA archive is the responsibility of the Computer Liaison Section (CLS) of the Water and Soil Directorate in the head office of the MWD, Wellington. Responsibility for developing new methods to enhance this archive lies with the MWD Hydrology Centre, Christchurch. Quality assurance aspects of the new procedures are developing so rapidly in 1985 that it is necessary for some archive maintenance to be done by the Quality Assurance Section (QAS) at the Hydrology Centre. The Water and Soil Instrument Service Centre (WSISC) at Kainga Rd, Christchurch is responsible for the maintenance of the data processing equipment as well as field instruments.

This handbook describes the 1985 practice whereby the field offices send floppy disks of new data to the QAS, where it is checked and loaded into the national TIDEDA archive. It is also an instructional manual to introduce field party staff to the hardware and software available to them for processing data in the field office.

The handbook is divided into four main sections.

(1) Section 1 sets out office procedures implemented to standardise the handling of hydrological data by all MWD field parties.

(2) Section 2 covers the operation of the electronic data processing (EDP) hardware issued to each field party.

(3) Section 3 provides a brief introduction to, and instructions for, the use of micro-TIDEDA and the other software packages used with it. Only those functions necessary for the successful operation of standard data processing procedures are covered.

(4) Section 4 covers the preparation of flow reports.

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OFFICE PROCEDURES

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SECTION 1 OFFICE PROCEDURES

This section sets out the procedures necessary to provide sufficient accessible information to enable the compilation of a history of all the operations applied to hydrological data, from the time of its measurement in the field to its final deposit in the MWD TIDEDA archive. These procedures supersede the relevant parts of MWD (1978) "Instructions for the Preparation of River Flow Reports", and complement Thompson and Rodgers (1985) "Micro-TIDEDA User's Manual" (note: all the processes and functions, unless otherwise referenced, come from the latter and are not separately referenced).

As soon as observations reach the field office (whether by telemetry, punched tape or on handwritten forms) they are entered in the field office microcomputer which then produces plots of the data. These "original plots" are a backup for all subsequent data processing, and are kept as archived documents in site folders. They are a convenient place to write notes because it is clear what the notes are about, and in many cases the plot shows evidence of errors that require explanations. Original plots of gauging cross-sections and rating curves, along with the various time graphs, equivalent to the documents previously available from chart recorders, are included.

1.1 DISKS

The field office must have a PROGRAM Disk and a number of DATA Disks which are referred to in this handbook as: WORKING, GAUGING, SITE, and TRANSFER. Data are initially written to the WORKING Disk (for series data) or GAUGING Disk (for gauging data). From these the data are copied to the appropriate SITE Disk, which is the local archive, and also to TRANSFER Disks for transfer to the national archive.

1.1.1 Maintenance of Site and Gauging Disks

The maintenance of the individual SITE Disks and GAUGING Disks is the responsibility of the field party. These are primary records only, and all the data should ultimately be filed on the VCC archive for widespread use. The amount of data held on SITE Disks in the field party offices is normally not less than the amount that can be held on one full disk per site.

The writing of SITE Disks with data from the VCC archives is carried out by the QAS. Notification of site numbers and the periods required should be submitted with the TRANSFER Disk, which will be returned with the data written on it.

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1.2 DOCUMENTS

1.2.1 Folder for Each Field Station

A folder is to be maintained for each flow recorder and rainfall station, which holds a description of the station and evidence of the data from it and of processing carried out on that data. Each batch of data is to be plotted and the plots kept together in chronological order of receipt, with a printout from the appropriate micro-TIDEDA translation process to show what corrections have been applied to it. The station log book pages, taken after each visit, are also to be kept in this folder. The folder must be stored in a fire-proof safe.

Summarising, the following are kept in each station folder:

(a) plots and printouts of translation specifications;
(b) a listing of comments filed about data accuracy;
(c) rating curve data (e.g., PRATE output);
(d) cross-section data (e.g., PSECT output);
(e) station photographs labelled with site number, date, and viewpoint;
(f) station history on form WS16 (figure 1), containing details of staff gauge locations and zero elevation, benchmarks locating all survey references (if any), recording equipment (including serial numbers).

Do not keep tables of daily means, etc., in station folders: these can be recorded elsewhere (e.g., in flow reports, see section 4).

1.2.2 Folder for the Field Party Office

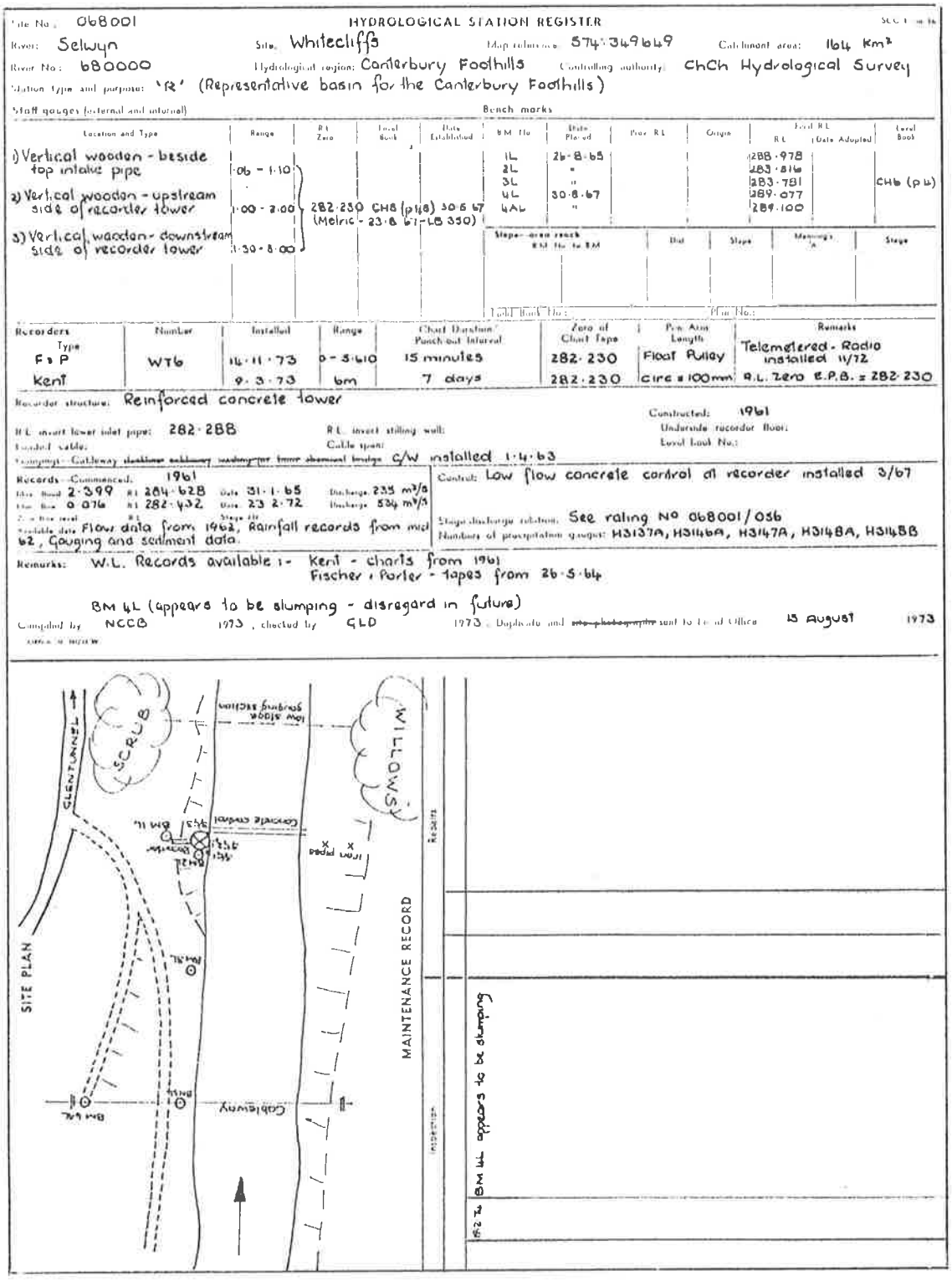
A folder is to be maintained containing a chronological record of data processing activities in the field office. It is to contain separate registers for the processing carried out on:

(a) water level data (figure 2);
(b) automatic raingauge data (figure 3);
(c) flow gaugings (figure 4).

These registers are to be updated daily, as data arrive.

It is also necessary to keep a record, in chronological order, of data movement from the field party office to permanent storage on the VCC archive; that is, copies of the WS61 forms (figure 5) used for transmitting data to and from the CLS, and a copy of the contents of the TRANSFER Disk (BSCAN and DASDIR) with the date it was sent to the QAS, which is signed off when the TRANSFER Disk is returned.

Publication no. 5 of the Hydrology Centre, Chriistchurch (1985)



HYDROLOGICAL STATION REGISTER

File No.: 068001
River: Selwyn
Site: Whitecliffs
Map reference: 574:349649
Catchment area: 164 Km²
River No.: 680000
Hydrological region: Canterbury Foothills
Controlling authority: ChCh Hydrological Survey
Station type and purpose: 'R' (Representative basin for the Canterbury Foothills)

Staff gauges (external and internal)

Bench marks

Location and Type	Range	RL Zero	Level Book	Date Established	BM No	Date Placed	Prov RL	Origin	Fixed RL RL	Fixed RL Date Adopted	Level Book
1) Vertical wooden - beside top intake pipe	0.06 - 1.10	282.230	CH6 (p14)	30.6.67 (Metric - 23.8.67 - LB 330)	1L	26-8-65			288.978		
2) Vertical wooden - upstream side of recorder tower	1.00 - 2.00				2L	"			283.816		
3) Vertical wooden - downstream side of recorder tower	1.30 - 8.00				3L	"			283.781		CH6 (p14)
					4L	30.8.67			289.077		
					4AL	"			289.100		

Slope - cross reach: BM No. to BM | Dist | Slope | Manning's n | Slope

Left Bank No.: | Plan No.:

Recorders Type	Number	Installed	Range	Chart Duration / Punch-out Interval	Zero of Chart Tape	Pen Arm Length	Remarks
F & P	WT6	16.11.73	0 - 3.610	15 minutes	282.230	Float Pulley	Telemetered - Radio installed 11/72
Kent		9.3.73	6m	7 days	282.230	Circ = 100mm	R.L. Zero E.P.B. = 282.230

Recorder structure: Reinforced concrete tower

Constructed: 1961

R.L. invert lower inlet pipe: 282.288

R.L. invert stilling well:

Cable used:

Cable span:

Underside recorder floor:

Level Book No.:

Footbridge - Cableway ~~shelter cableway washing~~ for former chemical bridge C/W installed 1.4.63

Records - Commenced: 1961

Max. flood 2.399 m RL 284.628 Date 31.1.65 Discharge 235 m³/s

Min. flow 0.076 m RL 282.432 Date 23.2.72 Discharge 534 m³/s

Zero flow level m RL Stage RL

Available data: Flow data from 1962, Rainfall records from mid 62, Gauging and sediment data.

Control: Low flow concrete control at recorder installed 3/67

Stage-discharge relation: See rating No 068001/036

Number of precipitation gauges: H3137A, H3146A, H3147A, H3148A, H3148B

Remarks: W.L. Records available :- Kent - charts from 1961
Fischer & Porter - tapes from 26.5.64

BM 4L (appears to be slumping - disregard in future)

Compiled by NCCB 1973, checked by GLD 1973. Duplicate and ~~photographic~~ sent to Head Office 15 August 1973

SITE PLAN

MAINTENANCE RECORD

Remarks | Inspection

BM 4L appears to be slumping

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Type of recorder: tape / ~~chart~~ Pulley size: 100/~~300~~ mm Punch interval: 900 secs.

No.	ON			OFF			PROCESSING						TRANSFER	
								Maximum			Minimum			
	Date	Time	G.H.	Date	Time	G.H.	Transfered	G.H.	Date	Time	G.H.	Date	Date	No.
111	5.4.84	1300	.996	8.7.84	1030	1.032	10/7	1.597	10/6	2015	.995	13/4	15/7	3
112	8.7.84	1045	1.032	10.10.84	1230	1.157	15/10	1.963	13/9	0430	1.013	31/7	16/10	1
113	10.10.84	1245	1.158	27.12.84	0315	.983	8/1	1.846	12/11	1345	.971	10/12	14/1	3
MR	27.12.84	0330		4.1.85	1345									
114	4.1.85	1400	.951	7.3.85	1145	.862	10/3	1.374	28/1	0930	.850	28/2		

Compression range: 0 mm River: Selwyn Site: Darkcliffs Site No: 68009

Figure 2 Water level recorder register

Type of recorder: Fischer & Porter Event Time interval: 360 secs.
Bucket size: 0.5 mm

No.	ON		OFF		PROCESSING			TRANSFER	
	Date	Time	Date	Time	Translated	Checkgauge	Recorder	Date	No.
36	13.5.84	1436	31.7.84	1206	1/8	209	221	10/8	1
37	31.7.84	1218	5.10.84	1054	10/10	442	448	10/10	1
38	5.10.84	1112	3.1.85	1330	6/1	196	203	7/1	2
39	3.1.85	1336	11.3.85	1500					

Catchment: Stanton
Raingauge: The Humps
Site number: 236110

Figure 3 Raingauge register

No.	DATE	RIVER	SITE	sedi	calc	check	plot
12074	7·1·85	Acheron	Clarence	✓	✓	✓	✓
12075	7·1·85	Clarence	Jollies		✓	✓	✓
12076	9·1·85	Selwyn	Whitecliffs		✓	✓	✓
12077	10·1·85	Stony Ck	Forbes Road	✓	✓	✓	✓
12078	10·1·85	Stony Ck	Sawbench Road	✓	✓	✓	✓

Figure 4 Gauging register

1.2.3 Permanent Identification

All data are to be permanently identified with site numbers and the dates of observation. These can be written directly on chart records and gauging cards, and on WS68 forms (figure 6) which are then attached to 16-track paper-tapes. These forms have been designed to conform with the appropriate micro-TIDEDA processes.

For identification, every water level tape must have a WS68A form, and every rainfall tape a WS68C form attached to them. Before filling in the forms, compare the data on the tape with the log book pages as the tape is rewound to the beginning. When filling in the appropriate identification form, note that:

(a) the apparent dates and times do not need to be entered on the WS68A and WS68B forms, if no time correction is necessary;
(b) stage heights do not need to be entered on the WS68A and WS68B forms, if no stage corrections are to be applied;
(c) the rainfall recorder total can be left blank on the WS68C form because process TRAIN calculates it.

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WS Form 61

THIS COPY TO ACCOMPANY DATA

№ 54653

Compiled by [illegible]
Data 12.3.85
Checked by [illegible]
Date 12/3/85

From Christchurch
To H.O.

File 12/28
Date 12.3.85
Sheet 1 of 1

Subject 'TCIRC' - charts for digitising

Enclosed herewith are the following:

SITE NO.	TYPE OF DATA	FROM DATE	FROM TIME	TO DATE	TO TIME			COMMENTS
91401	'TCIRC'	840304	001500	840504	101500			
91407	"	841124	151500	841214	104500			
91411	"	840821	130000	840928	113000			
91412	"	841016	150000	850110	081500			

THIS PORTION TO BE RETAINED

WS Form 61A

THIS PORTION TO BE RETURNED

Received the above H.O. To Christchurch

Signed

Date

Figure 5 WS61 form

Publication no. 5 of the Hydrology Centre, Chriistchurch (1985)

Form WS68A

RIVER Selwyn STATION Whitecliffs Tape No 111

SITE 68001 Min 0.995 15/4 Max 1.397 10/6

Start Date	Time	App Date	Time	Stage	On Rec
840415	130000			996	996
Finish Date	**Time**	**App Date**	**Time**	**Stage**	**Off Rec**
840708	103000		104500	1032	1032

Add Mult Comp 0 Interval 900

Form WS68B

MID-TAPE CHECK (UP TO 6)

Check	Date	Time	App. Date	Time	Stage
1	840609	120000			1064
2	840609	121500		123000	1063
3					
4					
5					
6					

Form WS68C

RAINGAUGE Stanton at The Humps Tape No. 36

SITE 236110 RAIN EVENT

Start date	Time	Check G.	Rec. Tot.	Manual punches 1	2	3	4
840313	1436	-	-	0012	0012		
Fin. date	**Time**	**Check G.**	**Rec. Tot.**	**Manual punches 1**	**2**	**3**	**4**
840731	1206	209	221	8707			

Interval 360 Bucket size 500

Form WS68D

MID-TAPE CHECKS (up to 6) WS 68D

Check	Date	Time	Check G.	Manual punches 1	2	3	4
1	840327	1206	52	3107	3107		
2	840610	1436	112	6492	6492	6492	
3							
4							
5							
6							

Figure 6 WS68 forms

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The mid-tape correction forms, WS68B and WS68D, do not need to be used if the translation specifications are printed and attached to the original plot. Where adjustments are to be made to either time or stage throughout the data, the following must be answered before proceeding:

(a) can you provide reasons for the adjustments?

(b) are the adjustments consistent with the previous batch of data?

(c) is any follow-up field work necessary and have the appropriate people been notified?

Answers to (a) and (b) must be fully documented on the original plot.

Attach the WS68 form to the beginning of the tape, leaving at least 300 mm of blank tape for starting the translator correctly. If there is only limited tape available, either add extra tape or attach the mid-tape checks form to the reverse side. As these forms are the only record of adjustments to the original observations, the need for clear annotation is obvious.

When the translation is completed, update the processing section of the appropriate register(s), accordingly. At the same time, check that all processing steps for the previous batch or batches of data for that particular site have been completed.

Note: All field data should be processed and updated in chronological order for each site.

1.3 INITIAL ELECTRONIC DATA PROCESSING

This section sets out the electronic data processing steps to be applied to the different field observations.

1.3.1 16-Track Paper-Tape Data

Figure 7 presents a flow diagram showing the steps to follow for the translation and subsequent micro-TIDEDA processing of 16-track paper-tape data. Corrections arising because of recorder or translator malfunctions are made, when necessary, in the editing steps.

(1) Tape Translation

Switch the ALTOS disk drive unit and the VDU on, making sure that the selector box is switched to the tape reader position (see page 40). Failure to do this before using process RTAPE will result in the ALTOS getting confused and not responding to anything.

Publication no. 5 of the Hydrology Centre, Chriistchurch (1985)

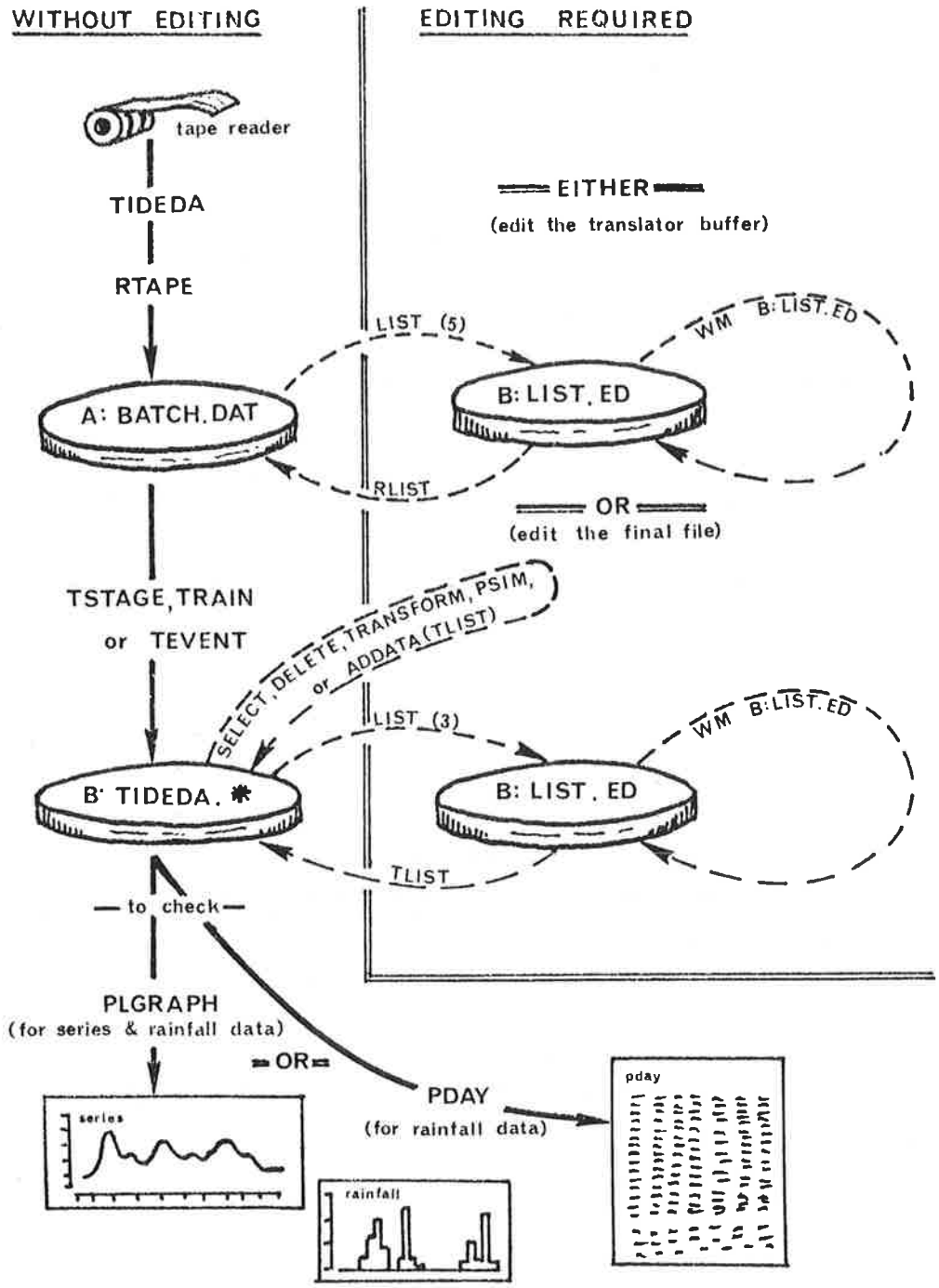

Figure 7 Flow diagram showing 16-track paper-tape translation and processing

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Insert the micro-TIDEDA PROGRAM Disk in Drive A and your WORKING Disk in Drive B, then boot the system by pushing the RESET button (see figure 19). When the prompt A> appears, type

```
A>TIDEDA<cr>
```

which will start micro-TIDEDA (refer pages 49-53). To read the tape, in response to the prompt **PROCESS**, type

```
RTAPE<cr>
```

Because micro-TIDEDA is a menu prompting program, process RTAPE gives instructions on how to start the tape reader (see also pages 40-42). But first, ensure that the tape is threaded through the machine with the first punches just past the left sprocket wheel (see figure 24).

After tape translation, the site number, dates and times have to be added, using process **TSTAGE** for stage series at equal time steps, **TEVENT** for stage series represented as unequal time steps for unequal changes of stage ('event' recorders have complex sampling criteria), and **TRAIN** for rainfall series represented as the unequal time steps for equal increments of rain. Corrections for stage and/or time errors are applied, and the data compressed. Zero compression is normal and exceptions must be approved by the Section Leader, QAS. Select the appropriate translation process by entering TSTAGE, TEVENT or TRAIN in response to the process prompt. When asked, enter the parameters that have been previously recorded on the WS68A or WS68C forms, and the results will be added to a file TIDEDA.* on the WORKING Disk.

If any input errors occur, relevant checking error messages will be displayed during the translation process. These are fully documented in Thompson and Rodgers (1985). For example, if the number of punches calculated between the apparent time on and the apparent time off in TSTAGE do not agree with the number from the tape reader, an error message will tell you how many above or below the correct number have been read. The translator buffer can be edited if errors due to tearing, tape weave, etc., make it impossible for the tape reader to translate them. This is carried out using **WORDMASTER** (see pages 53-55) on files written by option 5 of process **LIST**.

Stage series and rainfall series are subjected to different checking procedures.

(2) Checking Stage Series

Successful completion of TSTAGE will give the maximum and minimum gauge heights and their relevant times for the tape. Enter these figures on the water level recorder register (figure 2). The extremes from TEVENT processing can be obtained using process **PDIST**.

Publication no. 5 of the Hydrology Centre, Chriistchurch (1985)

To check the translated data, produce a plot using process **PLGRAPH** to scales suitable to detect site problems (e.g., silting) and translator errors. To do this, type **PLGRAPH** in response to the process prompt and when asked, enter the site parameters, followed by the scale parameters. The extremes obtained from processes TSTAGE and PDIST will help in determining the plot scales. Use metric time and stage scales (table 1). To obtain sufficient time resolution on initial plots, time scales should not exceed 6 hr/mm. When the plot is complete, attach the printout from TSTAGE or TEVENT parameter entries and add the following by hand (figure 8):

(a) date the data were translated;
(b) signature of the processor;
(c) notes of all corrections to the data, plus any subsequent actions carried out which change the data in the file from that which is plotted (e.g., removal of spikes, inserting manual data resulting from silting, etc.).

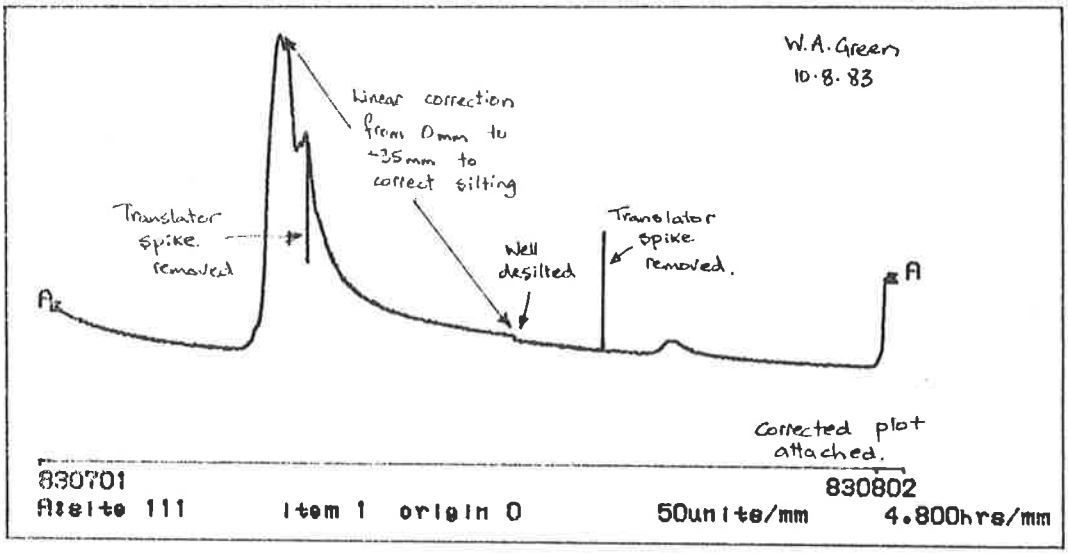
Table 1 Metric time scales and periods covered by a line that will fit on A4 paper

hrs/mm	days/mm	length (mm)	Period for that length	
			days	months
.125		192	1	
.25		192	2	
.5		240	5	
1		240	10	
3	0.125	256	32	1.0
6	0.250	260	65	2.0
12	0.500	260	130	4.0
24	1.000	260	260	8.5
27	1.250	260	325	10.7
48	2.000	260	520	17.0
60	2.500	260	650	21.3
120	5.000	260	1300	42.8

Examples of metric scales

1:10	10 units/mm
1:125	1.25 units/mm
1:20	2000 units/mm
1:25	250 units/mm
1:5	5 000 000 units/mm

Publication no. 5 of the Hydrology Centre, Chriistchurch (1985)




```
   MIDAS TIDEDA      VER 2.4
   TSTAGE            VER 1.8   25-01-84

B:TIDE1m.001    SITE     111

      START DATE      TIME  APPARENT-DATE    TIME     STAGE
          830701    131500         830701   131500

     FINISH-DATE      TIME  APPARENT-DATE    TIME     STAGE
          830801    121500         830801   121500


MID TAPE CORRECTIONS

CHECK No.    DATE      TIME  APPARENT-DATE    TIME     STAGE
     1       830801    53000         830801    53000   1728


OPTIONS

LABEL:
MUL      =          5  DIV     =          1  ADD     =          0
INTERVAL=        300
COMPRESS=          0

No. of values reduced from  2973 TO  2607
MINIMUM FOUND WAS          948 AT     830731    31500
MAXIMUM FOUND WAS         3981 AT     830709   193000
End of process
```

Figure 8 Original plot with TSTAGE printout of the parameters used

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For all sites the first plot becomes the original document. If any corrections are applied, another plot is necessary to show their effects (figure 9). Also refer to 1.2 Documents.

(3) Checking Rainfall Data

To check the **TRAIN** translated data, prepare a tabulation of the daily rainfall, using process **PDAY**. If the data are to be checked against an NZ Meteorological Service gauge, use **PWEEK** to tabulate the daily totals from 0900 h to 0900 h (NZDT). Remember to switch to the printer (see figure 19) or no printout will result. Add the following to the printout by hand:

(a) date the data were translated;
(b) signature of the processor;
(c) notes of any corrections made or problems encountered.

Finally, make sure all relevant parts of the raingauge register (figure 3) have been completed.

Note: The purpose of an automatic raingauge is to measure rainfall intensity. Where a considerable discrepancy occurs between the recorder and the checkgauge totals, file only those data from the recorder which are reliable. The checkgauge total and the period it covers should be placed in a comment which should also explain any associated gap in the record (see pages 18-20).

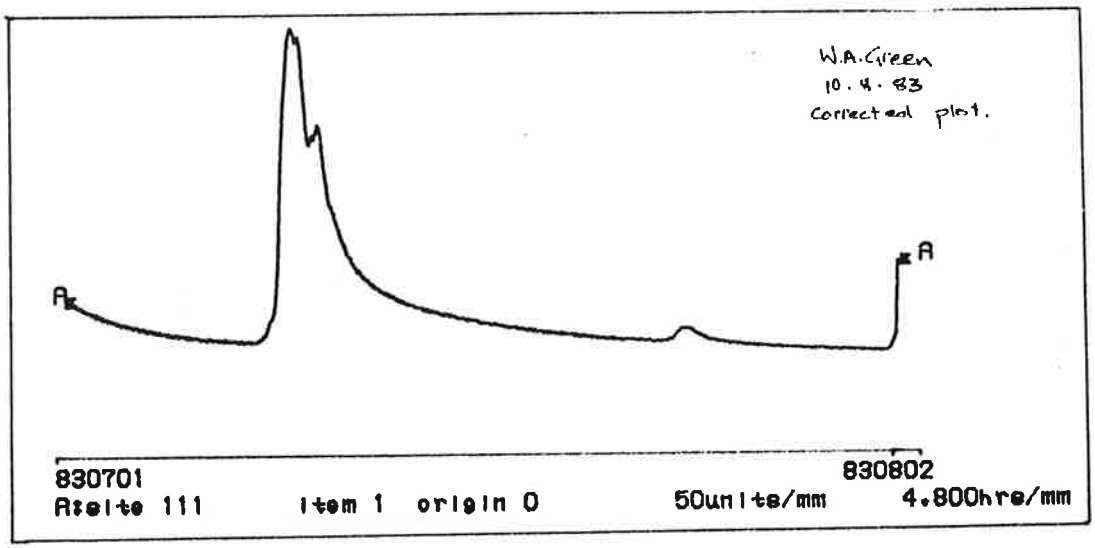

Figure 9 Plot of corrected hydrograph from figure 8

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(4) Correcting Stage and Rainfall Series

If errors have appeared in the data, use one of the following processes to correct them:

(a) process **DELETE** which removes data between specified dates and timcs, and so will remove spikes easily;

(b) process **TRANSFORM** to carry out linear corrections on sections of the data;

(c) process **ADDATA** to overwrite sections of incorrect data;

(d) process **LIST**, option 3, to write sections of the original file to a temporary file for editing, using **WORDMASTER**, then re-enter it using **TLIST**;

(e) process **LIST**, option 5, to write the translator buffer to a temporary file for editing, using **WORDMASTER**, then re-enter it ready for new TSTAGE parameters, using **RLIST**;

(f) process **SELECT** removes data between or outside specified stage heights, and so is useful for removing several recorder mis-punches or translator mis-reads;

(g) process **PSIM** can be used for other kinds of correction (e.g., a ramp correction).

Note: It is important to document in the site folder all corrections applied to the original data.

1.3.2 Chart Data

The introduction of ALTOS microcomputers has not brought any new equipment or changes to the processes used to digitise and add the data to the archives. The preparation of the charts for submission to CLS is covered in MWD (1982) "TIDEDA User's Manual", Section 4.2.

1.3.3 Manually Entered Series Data

Manual input of series data can be used to:

(a) supply corrections to existing data;

(b) input data for which there is no alternative method (e.g., manual staff gauge readings or storage raingauge data);

(c) input data read manually from chart recorders;

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(d) input synthetic data to cover gaps in records due to recorder failure.

Note: Synthetic data covering gaps in records should only be constructed using the guidelines set out on pages 28-29.

Before entering manual data, apply the necessary time corrections. The data are entered using process **ADDATA**, which enters data into a list file (figure 10). When all the data for one site have been entered into the list file and checked, it can be added to the file TIDEDA.* as a new batch of data by using process **TLIST**. This batch of data will overwrite any previous data for the same site and period of record, and can be checked by either listing or plotting it.

1.3.4 Comment Data

There is no facility in micro-TIDEDA for entering text to either identify the record or give information about the accuracy of the data. Comments can be entered using:

(a) DATASTAR and form COMMENT (figure 11); the files COMMENT.DTA are then sent to the QAS for updating to VCC archives; or

(b) TIDEDA process ADCOMMENT and updating by the CLS, using process MELEM (MWD 1982).

To use DATASTAR (refer pages 55-56) to fill in form **COMMENT**, place the PROGRAM Disk in Drive A and your WORKING Disk in Drive B and type:

```
A>DATASTAR COMMENT<cr>
```

The program will ask which drive COMMENT.DTA and COMMENT.NDX are to be filed on, respond with B for each. Press the space bar to enter ADD mode, and fill in the site number, date, time and text of the comment you wish to add to the archive. When the form is completed, type **^B<cr>** to file it.

More comments can be added on separate forms. When all the comments have been entered, type

```
^E E ^C
```

to exit the DATASTAR program.

Use **PIP** (see page 47) to copy COMMENT.DTA to the TRANSFER Disk (see page 24), and send to the QAS for updating to the VCC archive.

Initial comments must be entered for all new sites before the first batch of series data is submitted for updating. If the initial comment is updated

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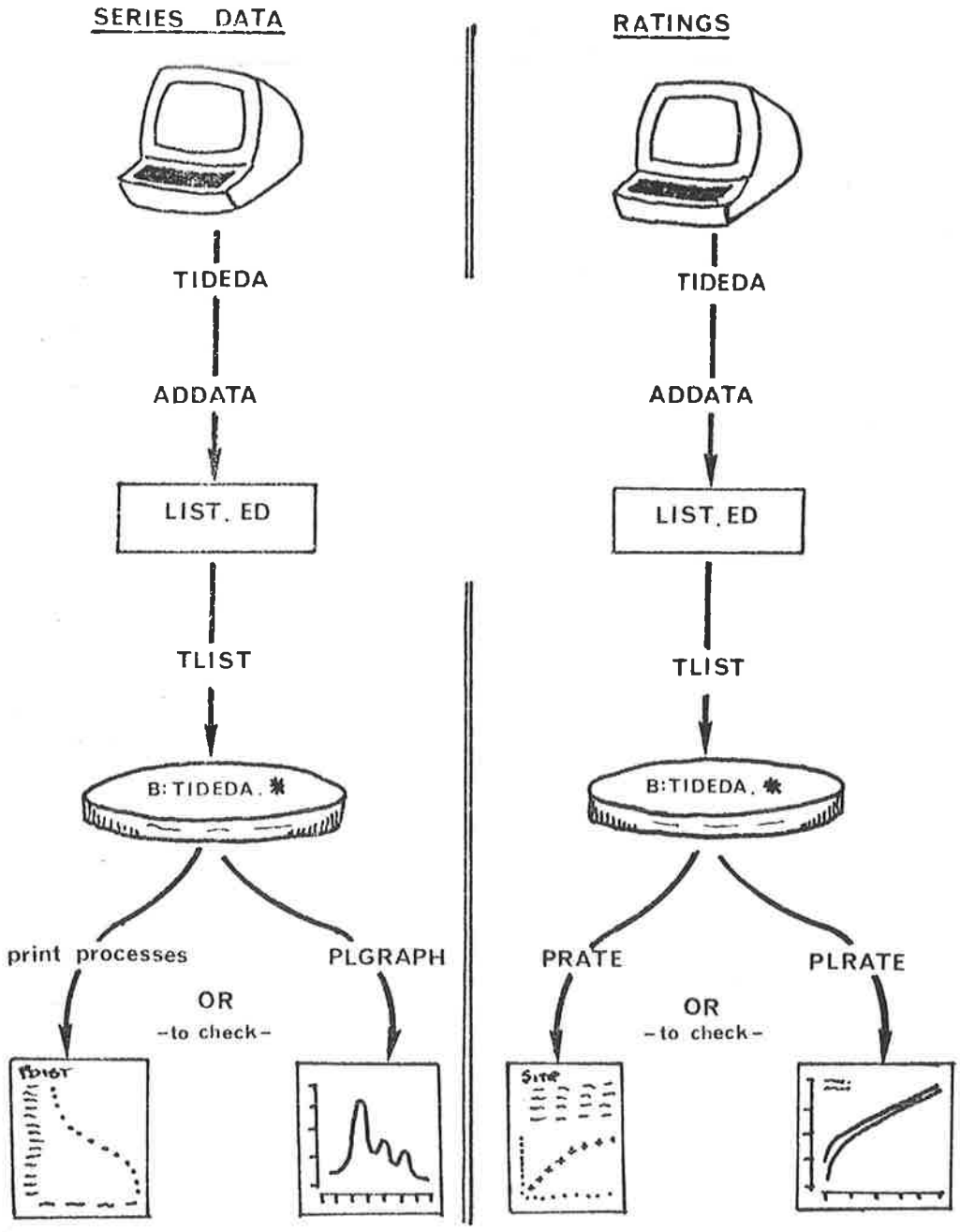

Figure 10 Flow diagram showing manual data and rating table input using process ADDATA

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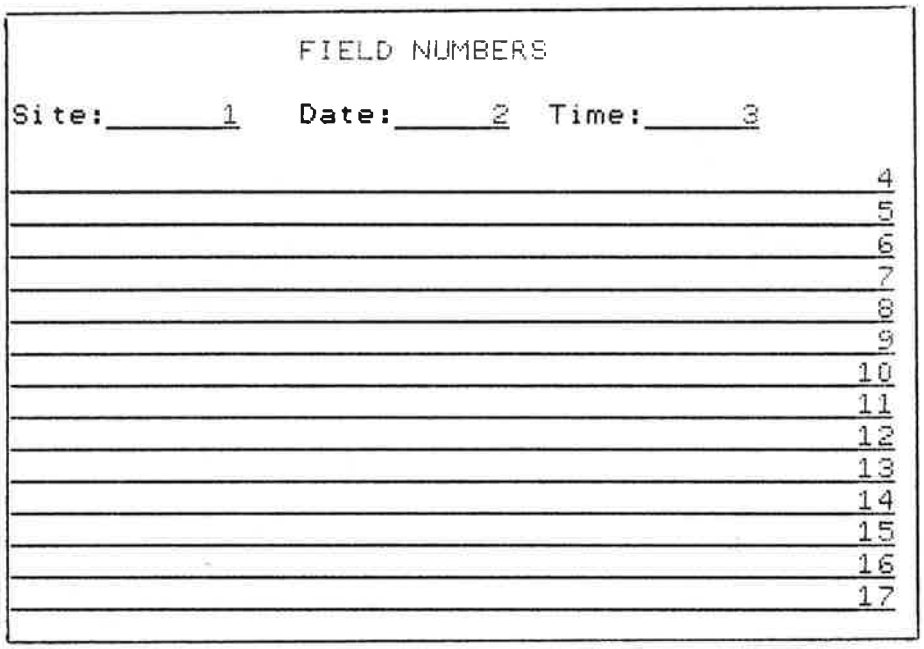

Figure 11 DATASTAR form COMMENT for entering comment data

using TIDEDA processes ADCOMMENT and MELEM (MWD 1982), inform the QAS of the site name and the VCC water district it is to be stored in, when the first batch of series data is sent for updating.

Comments covering the accuracy of data and gaps in records should be informative, coherent and identify the period(s) for which the data are suspect.

1.3.5 Flow Ratings

The construction and identification of changes in stage discharge ratings will be covered in detailed procedures still under development. To add rating co-ordinates to a file TIDEDA.*, use process **ADDATA**, which enters ratings into a list file (figure 10). To smooth rating changes enter a start date and hour when the previous rating begins to lose effect, and a later effective date and hour when the new rating is in full effect. If no smoothing is needed, then the start and effective dates and hours are to be the same. The first rating available on a file is fully effective from its start date, even when its effective date is later. When preparing a tabulation (e.g., PDAY) from a part record, sufficient ratings should be kept so that the effective time of the first rating is earlier than the start of the part record.

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A minimum of 3 and a maximum of 50 co-ordinates can be entered for any one rating. Enough co-ordinates should be entered to accurately represent the shape of the rating curve, with emphasis around the parts of the curve identifying changes in control and/or cross-section shape (e.g., change to berm flow).

When the co-ordinates have been entered, the rating can be added to the file TIDEDA.* using process **TLIST**. The rating can be checked using process **PLRATE** (figure 12) and a printout obtained of the rating table, using process **PRATE**.

Sediment ratings and reduced level (RL) conversion ratings can be entered by the same processes, except the item numbers to be given are 2 for sediment and 3 for the RL conversion ratings.

Ratings can also be entered directly into the VCC archive by using TIDEDA process **ADRATE** (MWD 1982).

1.3.6 Flow Gaugings

A program has been developed through which gauging card field information can be entered and the results calculated and stored as file F4A.DTA, using the ALTOS microcomputer. Detailed procedures for its use will be set out in "RHAP User's Guide", which is still under development.

There are three micro-TIDEDA processes which can be used to display gauging data, with either ratings or series data stored on TIDEDA.*. They are:

(a) process **PLRATE** which plots the gaugings on the rating curves (figure 12), with the option of adding error bars;

(b) process **PLGRAPH** which plots the gaugings on the time/flow data (figure 13);

(c) process **PLBED** which plots the bed plot, indicating the difference in gauge height (mm) between the gauged and rated flow from the rating table (figure 14).

1.3.7 Cross-Section Data

There is no facility in micro-TIDEDA for adding cross-section data to a TIDEDA file, but a program (called RHAP) is being developed at the Hydrology Centre, which will allow this in future.

1.4 QUALITY ASSURANCE AND ARCHIVES

Up to this point, all the new series data have been translated to a WORKING Disk and the gaugings to a GAUGING Disk. To keep track of

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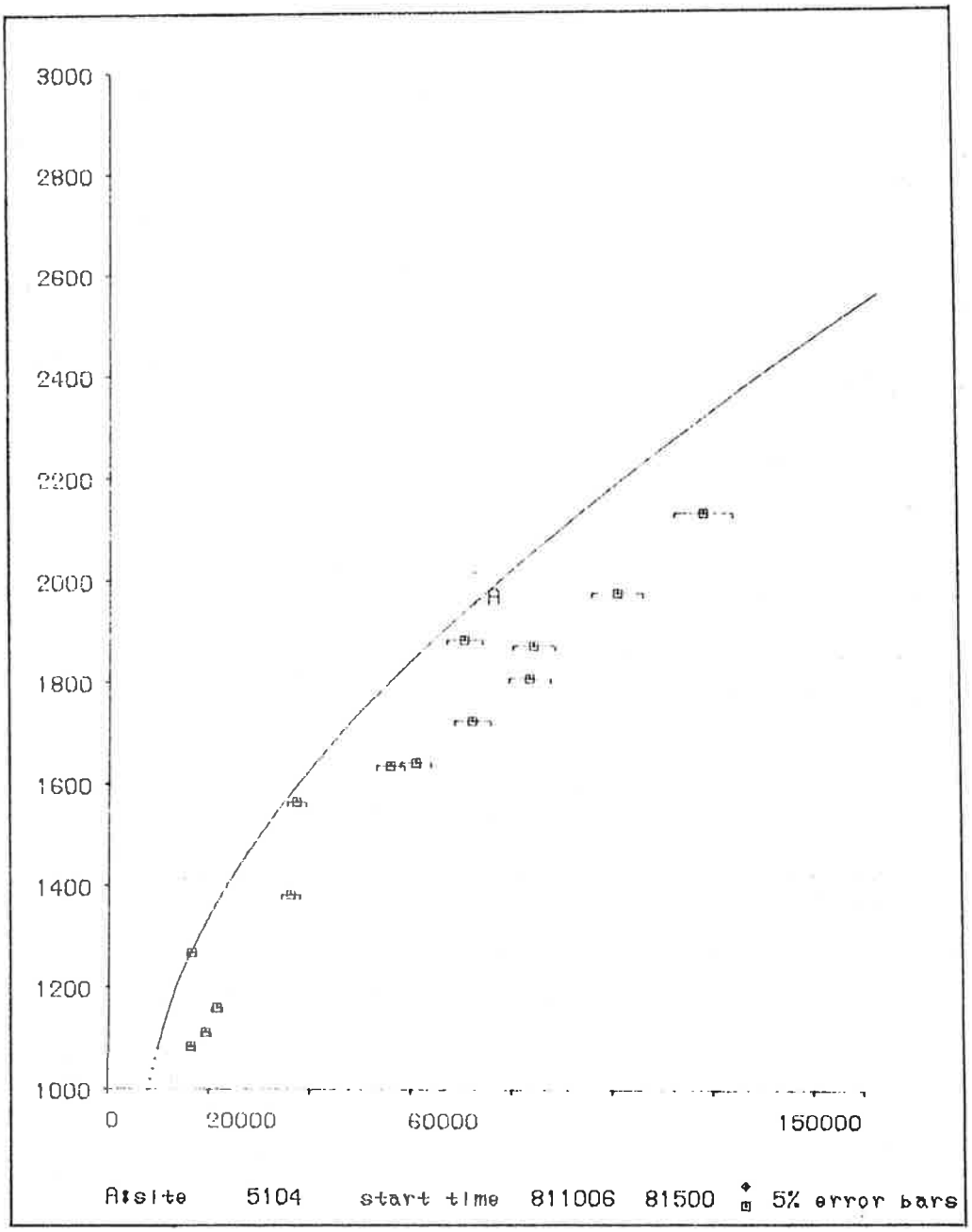

Figure 12 Process PLRATE: flow ratings and gaugings with 5% error bars

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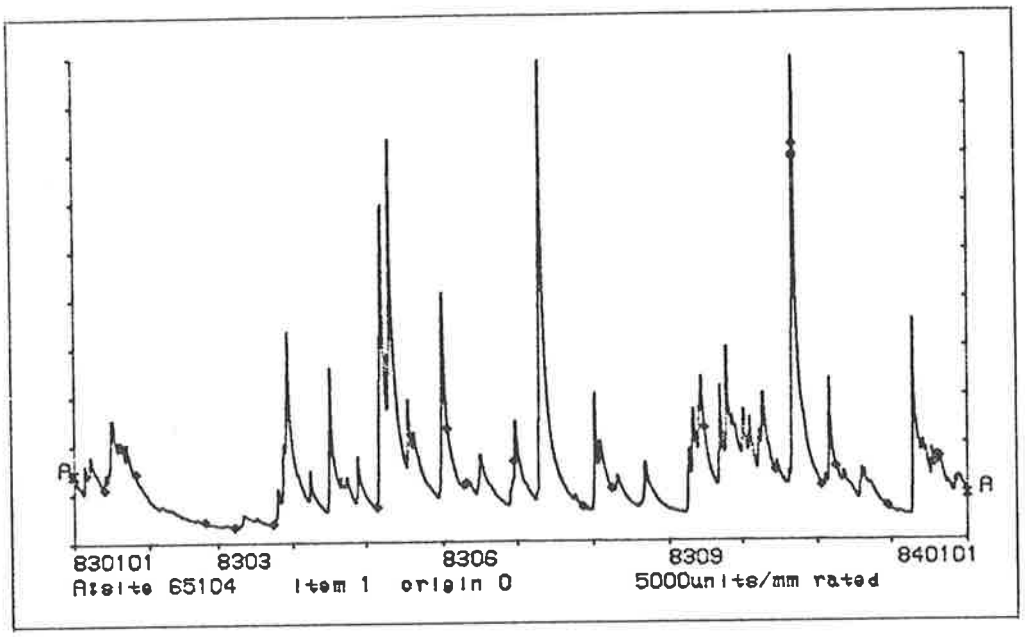

Figure 13 Discharge hydrograph with gaugings plotted

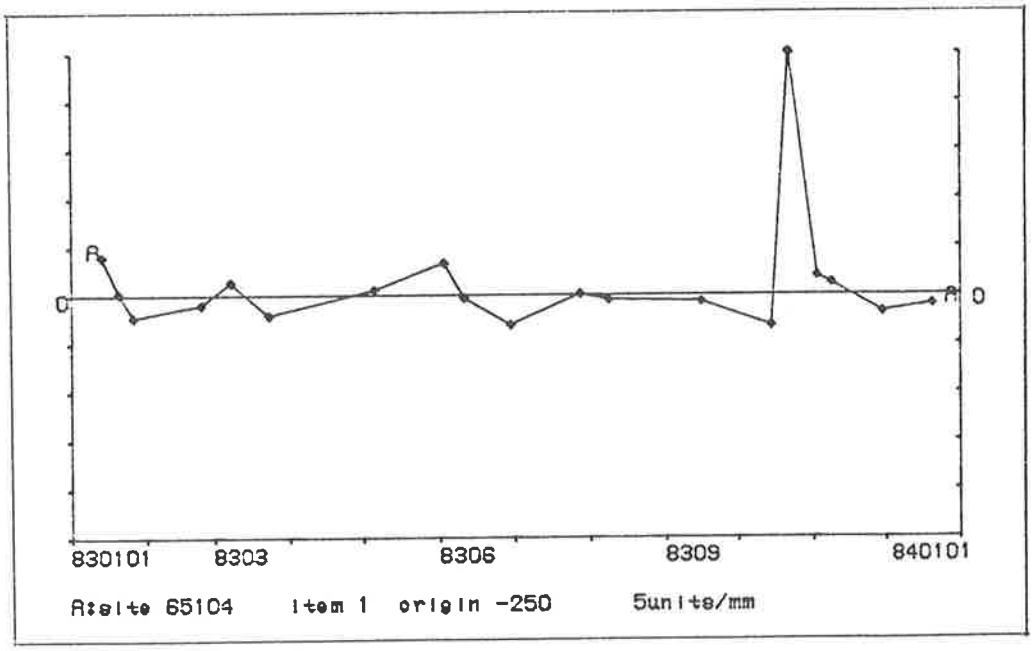

Figure 14 Bed plot of figure 13 gaugings using process PLBED

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data translation a listing of the contents of the WORKING Disk should be printed daily, using process **BSCAN**.

All new field data is to be updated to permanent storage on the VCC archives at regular intervals (approximately fortnightly). Figure 15 provides a flow diagram showing the steps to be taken in transferring all data, via TRANSFER Disks, from field party offices to the VCC archives.

1.4.1 Transfer Disks

Copy all the latest series data in the file TIDEDA.* to a numbered TRANSFER Disk, using **CPCOPY** (see page 48). Providing space is available, the latest gaugings can be added to the TRANSFER Disk, using **PIP** (see page 47). If spare space is not available, an additional TRANSFER Disk may be used. Before sending the TRANSFER Disk to the QAS, use **CPCOPY** to make a backup disk, giving it the same number as the TRANSFER Disk. This backup disk is to be held until its corresponding TRANSFER Disk has been returned, just in case something happens to the original in transit.

If data for a new site are on the TRANSFER Disk, details of the site number, river and site names, and the VCC water district the data are to be stored in should be sent to the QAS with the disk. An initial comment (MWD, 1978) should also be added to the VCC archive (refer to pages 18-20, Comment Data).

All TRANSFER Disks sent to the QAS should have with them:

(a) a list of the contents of the TIDEDA.* file, obtained using process **BSCAN** (figure 16);

(b) a list of the gaugings obtained using **DASDIR** (figure 17). Details of the DASDIR program will be given in the "RHAP User's Guide".

Note: (i) Post floppy disks in normal OHMS envelopes with a piece of stiff cardboard on both sides to prevent bending. Ordinary postage is adequate.

(ii) There is no need to use WS61 forms with these TRANSFER DISK movements.

Finally, ensure that batches of new data have been copied to their relevant SITE Disk, using process **COPY**. The WORKING Disk can now be cleaned of all data, using **REFORM** and **SYSGEN** (see pages 45-46), and reused.

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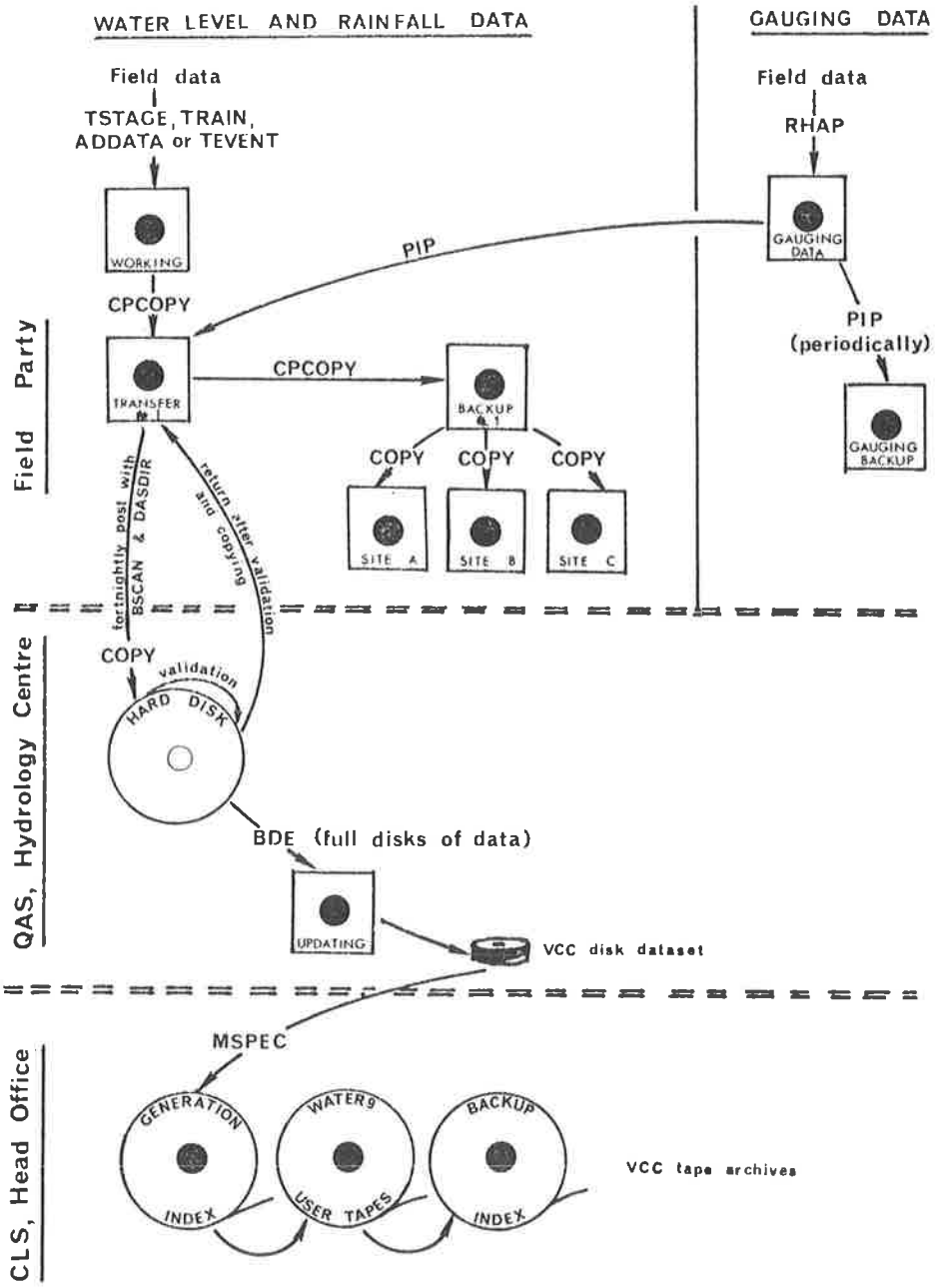

Figure 15 Flow diagram showing conventions for floppy disk transfer and storage

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```
~~~ BSCAN ~~~
Logical directory on drive F

No.    SITE      START   TIME      FINISH   TIME    ITEMS   KIND     KBYTES

 1     75214    830510  140000    830718  150000      1  INSTANT     20.5
 2     75219    830323  131500    830802  164500      1  INSTANT     51.8
 3     75251    830429  143000    830721  140000      1  INSTANT     14.5
 4     75262    830510  134500    830805  112700      1  INSTANT     23.0
 5     75263    830422  153000    830805  133000      1  INSTANT     39.5
 6     75277    830719  133000    830805  140000      1  INSTANT     12.1
 7     75292    830513  140000    830811  131100      1  INSTANT     62.9
 8     75294    830408  120000    830629  135500      1  INSTANT     29.5
 9    486610    830309   84500    830616  101500      1  INCRMNT      2.4
```

Figure 16 Process BSCAN output showing contents of TIDEDA.* file

```
Gauging No.          Site                    Date      Flow m3/s     Stage m

109155      21409  Waiau @ Otoi             830531       18.7661        .86
109176      21409  Waiau @ Otoi             830805       19.612         .875
109182      21409  Waiau @ Otoi             830906       11.044         .736
109156      21601  Tahekenu @ Glenstra      830531       96.440        1.442
109175      21601  Tahekenu @ Glenstra      830805      212.461        1.578
109183      21601  Tahekenu @ Glenstra      830906      213.56         1.585
109154      21801  Mohaka @ Raupunga        830530       48.547        2.092
109165      21801  Mohaka @ Raupunga        830705       53.8163       2.160
109174      21801  Mohaka @ Raupunga        830804      109.20         2.527
109184      21801  Mohaka @ Raupunga        830907       43.7245       2.099
109157      21803  Mohaka @ Glenfall        830527       23.434        1.32
109163      21803  Mohaka @ Glenfall        830704       29.6192       1.402
109171      21803  Mohaka @ Glenfall        830727       25.423        1.345
109179      21803  Mohaka @ Glenfall        830901       25.2428       1.333
109153      21812  Mohaka @ Willowfl        830530       42.7409       3.290
```

Figure 17 Output from DASDIR program showing contents of F4A.DTA file

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1.4.2 Validation

To validate data en route to the VCC archive, the QAS:

(a) checks that new batches of data follow on from previously filed data and that there are data from all sites listed in a hydrological survey programme; if there is a gap, then a comment for the period (refer to pages 18-20, Comment Data) is made on the TRANSFER Disk;

(b) plots hydrographs for visual inspection;

(c) checks the adequacy of gaugings against hydrographs, and on the current rating curves;

(d) compares records from adjacent sites.

The processes used by the QAS to validate data en route to the VCC archive are also available to field parties. Data not passing this validation will be brought to the attention of the appropriate field party leader. Consistent errors by one field party will be brought to the attention of the district research and survey co-ordinator for remedial action.

After validation by the QAS, the TRANSFER Disk is cleaned of all data, using **REFORM**, and checked for deterioration, using **WOF** (see page 49), before being returned to the appropriate field party. On receipt of the TRANSFER Disk, the field party can re-use it and its equivalent backup disk, knowing that the data have been transferred to the VCC archive.

1.4.3 Updating to the VCC Archives

The data arriving on the TRANSFER Disks are classified into:

(a) series data;
(b) ratings, comments and gap markers;
(c) gauging data.

The transfer of data from the ALTOS microcomputer to the VCC archives is carried out by the QAS (figure 15), using the program **BDE** (Binary Data Exchange), which converts the data into a form compatible with the VCC computer. The data are then updated to the national archives by the CLS.

Lake sites that need special repacking will receive this transformation, with the repacked batch going to the district file and the unrepacked batch going to the lake level file (WATER9.LAKELEV.DATA).

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The gaugings supplied to the QAS on the file F4A.DTA are submitted to a program that abstracts the fifteen items required for VCC storage, and tranfers them in the usual way. A similar facility is used to transfer cross-section data.

1.4.4 Gaps in a Record

No entirely satisfactory procedure exists for dealing with gaps in records. Simply mark gaps in the record, and users requiring data for missing periods must construct their own. When continuity of record is required in the field office, such as to enable production of monthly and annual summaries, insertion of synthetic records, usually constructed by a variety of correlational methods, can be done temporarily, but should not remain in the archive as if they were 'observations'. Interpolation across short gaps in recessions may be acceptable if only monthly or annual summaries are required.

Note: where there is a backup recorder installed and the primary recorder fails, manually prepared data from the backup is not synthetic data.

1.4.5 Marking Gaps in Records

Within micro-TIDEDA, each batch of data describes a record from a start time to a finish time. Interpolation between values is assumed to be valid for all intermediate times within a batch, but it is not always valid between the finish of one batch and the start of the next. When a new batch is first entered, its directory entry automatically has a gap marker which prevents interpolation between its start time and any earlier data that may already be filed. Thus, a missing record between two batches is automatically marked, and interpolation between the values is prevented.

When data are deleted, using process **DELETE**, a gap is automatically introduced. Thus, when a batch of data already filed includes a period without data that should be marked as a gap, then deletion of that period will introduce the required gap marker.

A gap marker which has been introduced automatically and is not required can be removed by using process **GAP**. Also, if when editing a file a batch is linked into the directory whose time overlaps part of an existing batch, then any gap marker on the batch which finishes later will automatically be deleted.

Because of updating procedures which safeguard the VCC archive, the gap markers introduced by micro-TIDEDA files are not automatically translated with the rest of the data. Gaps are transferred separately to the VCC archive by the QAS, only if they are specified in a GAP.DTA file on the TRANSFER Disk. This is done using DATASTAR form GAP (figure 18).

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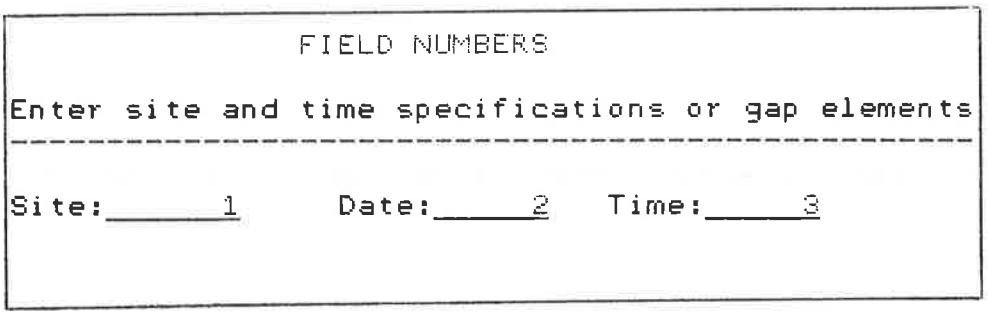


Figure 18 DATASTAR form GAP for entering gap markers

Where a gap appears in the record, a comment covering the gap filed, using **DATASTAR** form **COMMENT** (figure 11), is to be made which identifies the period and lists other sites or rainfall stations which can be used to construct a synthetic record if required. For automatic rainfall data, the period plus a storage gauge total for that period should be given.

To use **DATASTAR** (refer pages 55-56) to fill in form **GAP**, place the PROGRAM Disk in Drive A and your WORKING Disk in Drive B and type:

```
A>DATASTAR GAP<cr>
```

The program will ask which drive GAP.DTA and GAP.NDX are to be filed on, respond with B for each. Press the space bar to enter ADD mode, and fill in the required information. When the form is completed, type **^B<cr>** to file it. When all the markers have been entered, type

```
^E E ^C
```

to exit the DATASTAR program.

Use **PIP** (see page 47) to copy GAP.DTA to the TRANSFER Disk (see page 24) and send to the QAS for updating to the VCC archive.

1.4.6 Urgent Updating of Data

Send disks of new data for urgent analysis, either by courier service or overnight air delivery, to the QAS. Supply **BSCAN** and/or **DASDIR** with a note to say it is **URGENT** and anything else that should be done to it. If the data are needed before updating to WATER9 user tapes, also supply a VCC dataset name (e.g., WYAARO.URGDAT.DATA) in the user's name. Watch for that dataset name with your urgent data to appear under your

Publication no. 5 of the Hydrology Centre, Chriistchurch (1985)

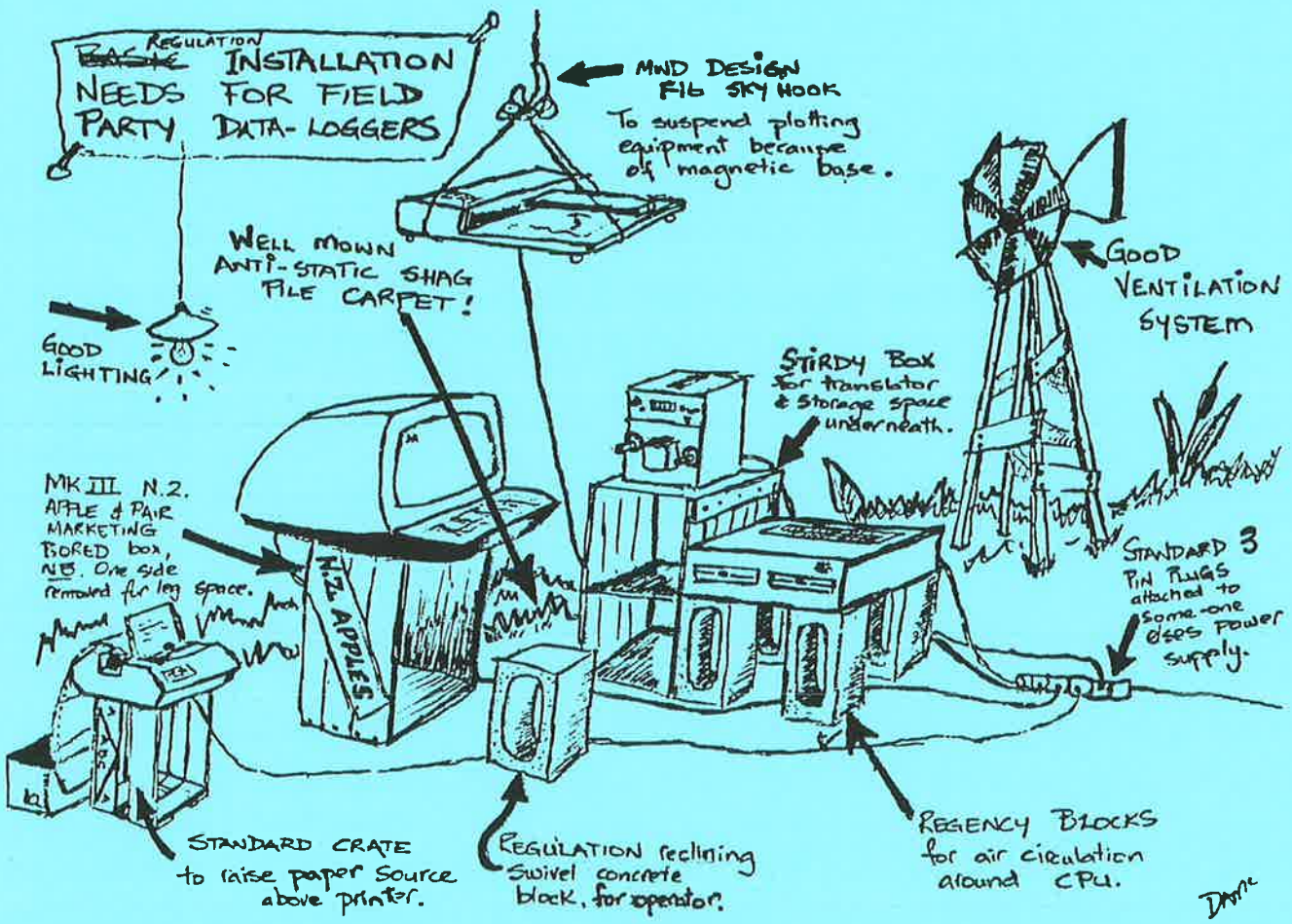
userid the next day. The data will also take the usual course through validation and updating to the VCC archive (approximately a week).

1.4.7 Certification of Data

Certification of data (i.e., that the data for a site are complete) is carried out annually by the Technical Officer (data) in each district, in a written notification sent to the CLS.

Publication no. 5 of the Hydrology Centre, Chriistchurch (1985)

HARDWARE



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SECTION 2 HARDWARE

Each MWD field party has been issued with an ALTOS microcomputer, either a Televideo 910 or Kimtron Video Disply Unit (VDU), a printer (Oki or Star), an Enviro-Labs Inc. 16-track paper-tape reader, and an Iwatsu or Watanabe A3 pen plotter. The ALTOS was chosen in 1980 from the many alternative inexpensive microcomputers which supported the de facto standard CP/M operating system, because it had improved performance using an AMD maths processor. The Enviro-Labs paper-tape reader was the only available machine and had to be adapted by the MWD. The other hardware components were chosen from many alternatives, being the least expensive which met a general specification.

2.1 THE ALTOS MICROCOMPUTER

2.1.1 Switching On

The first step is to turn on both the ALTOS disk drive unit (figure 19) and the VDU (figure 20). The VDU should beep momentarily when turned on and show a square light in the top left-hand corner. This is called the cursor and tells you where you are up to on the screen.

If you are going to use the Iwatsu plotter, it **MUST** be turned on before the ALTOS, otherwise the plotter will not work and you will have to turn them both off and then on again, this time in the correct order.

2.1.2 Cautions about Disks and Disk Drives

* Handle disks carefully, do not touch the exposed surface and always keep them in the packet when not in use.

* Do not switch the disk drive unit on or off with disks in it.

* Do not open the disk drive doors when the red indicator light is shining

* Do not put disks down on the plotter bed because it is magnetised and will destroy the disk's contents.

* Keep the disk drive doors shut when not in use, to reduce dust intrusion.

2.1.3 Booting

Having switched the ALTOS on, you now have to get the attention of the computer system: this is called "booting". To "boot" the ALTOS, place the PROGRAM Disk in Drive A (folded edges down), close the drive door,

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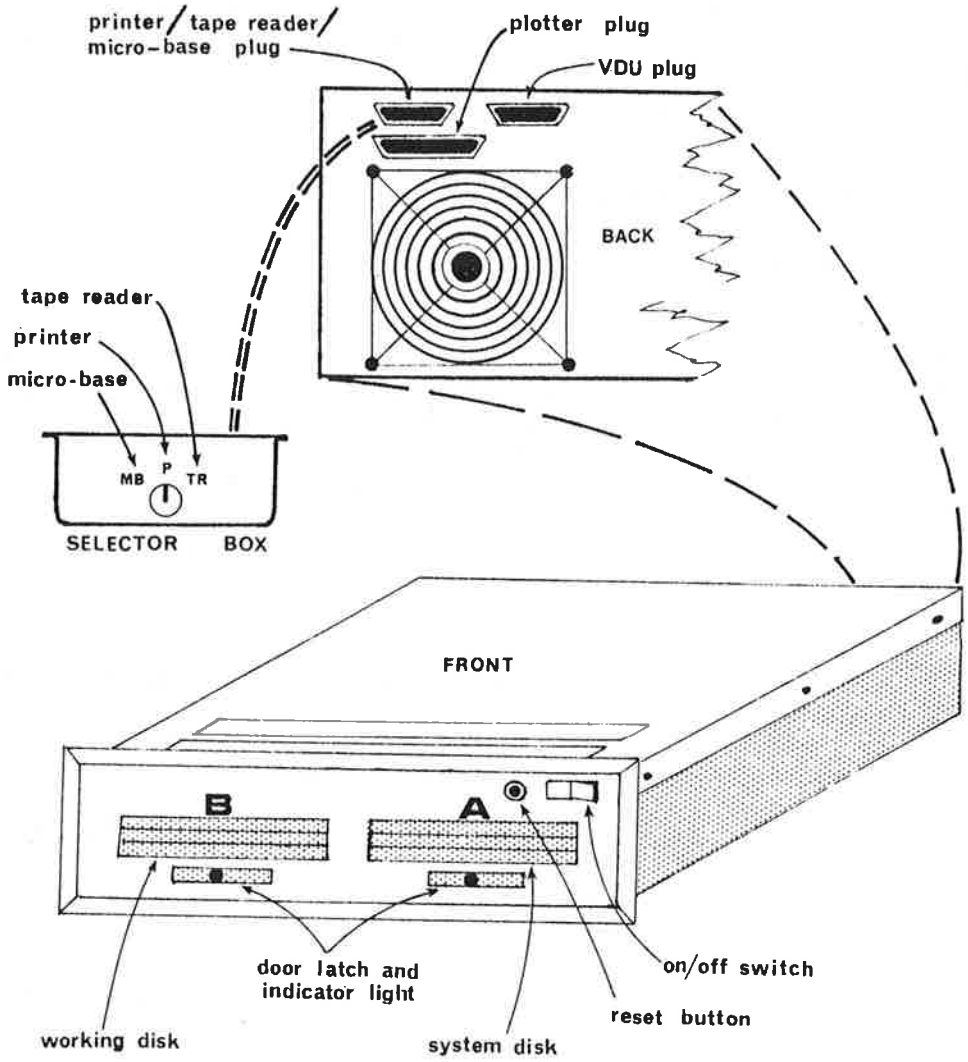

Figure 19 ALTOS microcomputer disk drive unit and selector box

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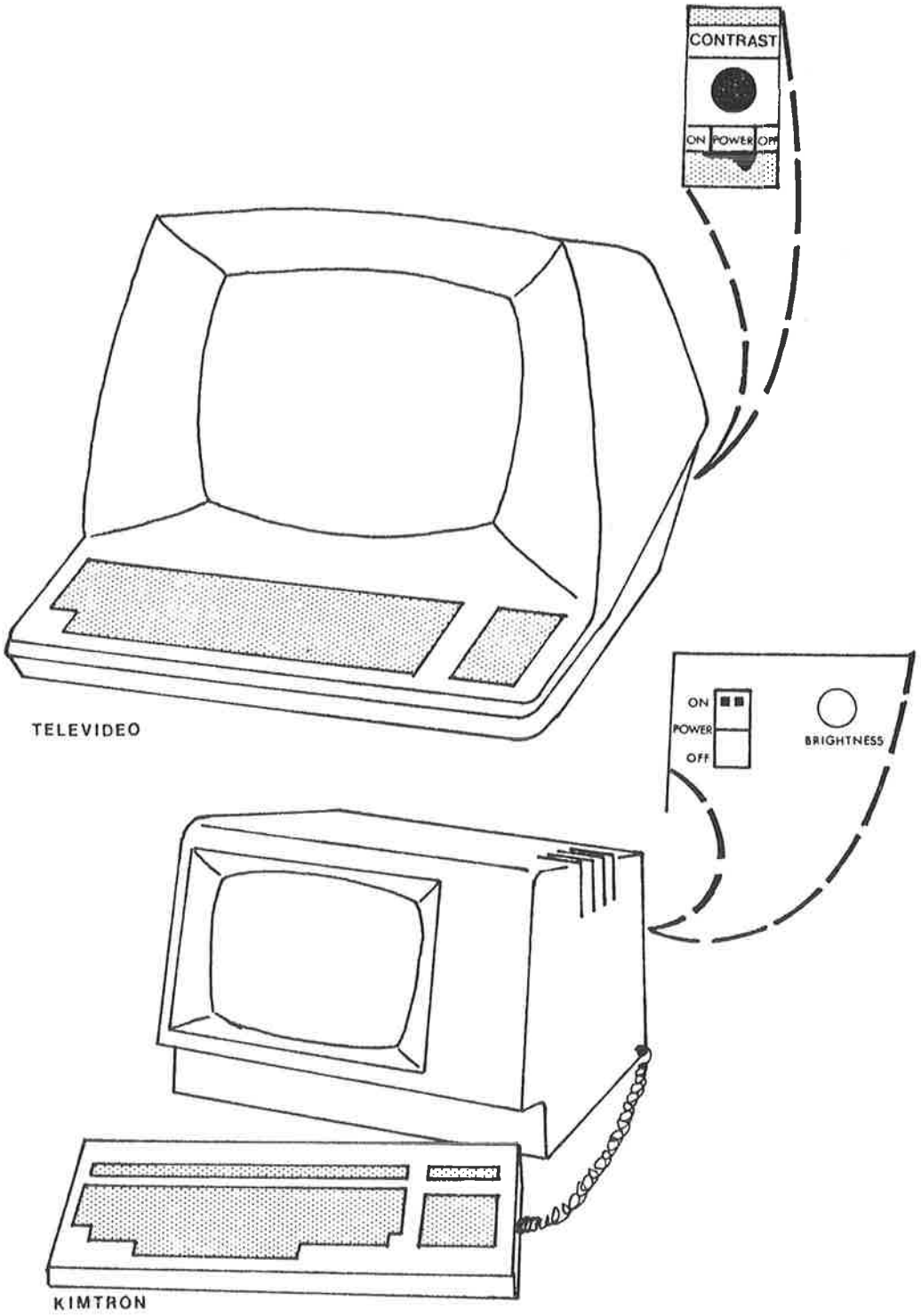


Figure 20 Televideo and Kimtron video display units

Publication no. 5 of the Hydrology Centre, Chriistchurch (1985)

and press the RESET button (see figure 19). The computer should respond on the VDU with:

```
64K MWD LOADER VER ....
64K MoWDOS VERS ...
A>
```

A> is called the CP/M prompt: it tells you that the computer system is running and that Drive A is the Working Drive (see page 43). If A> does not appear, check the following, remembering to **REMOVE DISKS** before turning the disk drive unit on or off:

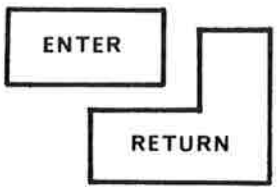
Is everything plugged in?
Is the VDU switched on?
Is the disk drive unit switched on?
Is the brightness on the VDU turned up? (dial on the back)
Is there a PROGRAM Disk in Drive A?
Is the disk the right way up?

If there is still no reassuring A>, remove the disks, turn all the switches off, wait a few seconds and turn everything on again, put the disks back in and press the RESET button once or twice. Repeat this procedure several times, if necessary, before returning the equipment to the WSISC for servicing.

If the VDU locks up during operation the RESET button may be pressed without removing the disks.

2.1.4 The Keyboard

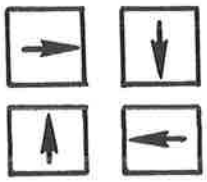
Even though the keyboard layouts on the Televideo and Kimtron VDUs differ slightly, the keys function in exactly the same way. Most of the keys are like ordinary typewriter keys, but there are a few which are specific computer keys and need some explanation.



The **RETURN** or **ENTER** key, written <cr>, sends whatever you have typed on the screen to the computer for processing. Most typing on the screen will have no effect until <cr> is pressed.

The **CAPS LOCK** key locks only the alphabet keys into upper case. All the other keys (numbers, punctuation) still need the SHIFT key to be pressed to get the "upper case".

Publication no. 5 of the Hydrology Centre, Chriistchurch (1985)



The **"cursor control"** keys, written <right arrow>, <left arrow>, etc., move the cursor in the direction indicated.

The **HOME** key moves the cursor to the top left-hand corner of the screen.

The **LINE FEED** key moves the cursor to the left-hand side of the next line down, but sends no information to the computer.

The **CONTROL** key, written ^, is only useful in conjunction with one of the alphabet keys. It must be held down while the second key is pressed.

2.2 PRINTERS

MWD uses two types of printer with its ALTOS microcomputer: the Oki (Okidata Microline 82A), shown in figure 21, and the Star (Star DP510), shown in figure 22. Although their front panel controls differ slightly, their operation is basically the same.

The cable connecting the computer to the printer shares the same plug on the back of the ALTOS as the tape reader and micro-base via the selector box (figure 19). Therefore, remember to switch from the tape reader position after use or the computer will not be able to communicate with the printer.

Printers have two modes of operation, usually called ON and OFF LINE. The printer must be ON LINE for the microcomputer to be able to print something, and must be OFF LINE if you want to use the front panel controls. To go from ON LINE to OFF LINE, and back again, the Oki has a button marked **SEL** and the Star a button marked **ON LINE**. Simply press this button, and when the light of the same name is shining the printer is ready to print.

The other front panel controls are:

The **LINE FEED** or **LF** button which moves the paper up one line.

The **FORM FEED** or **FF** button which feeds one whole page of paper (i.e., from perforation to perforation) through the printer.

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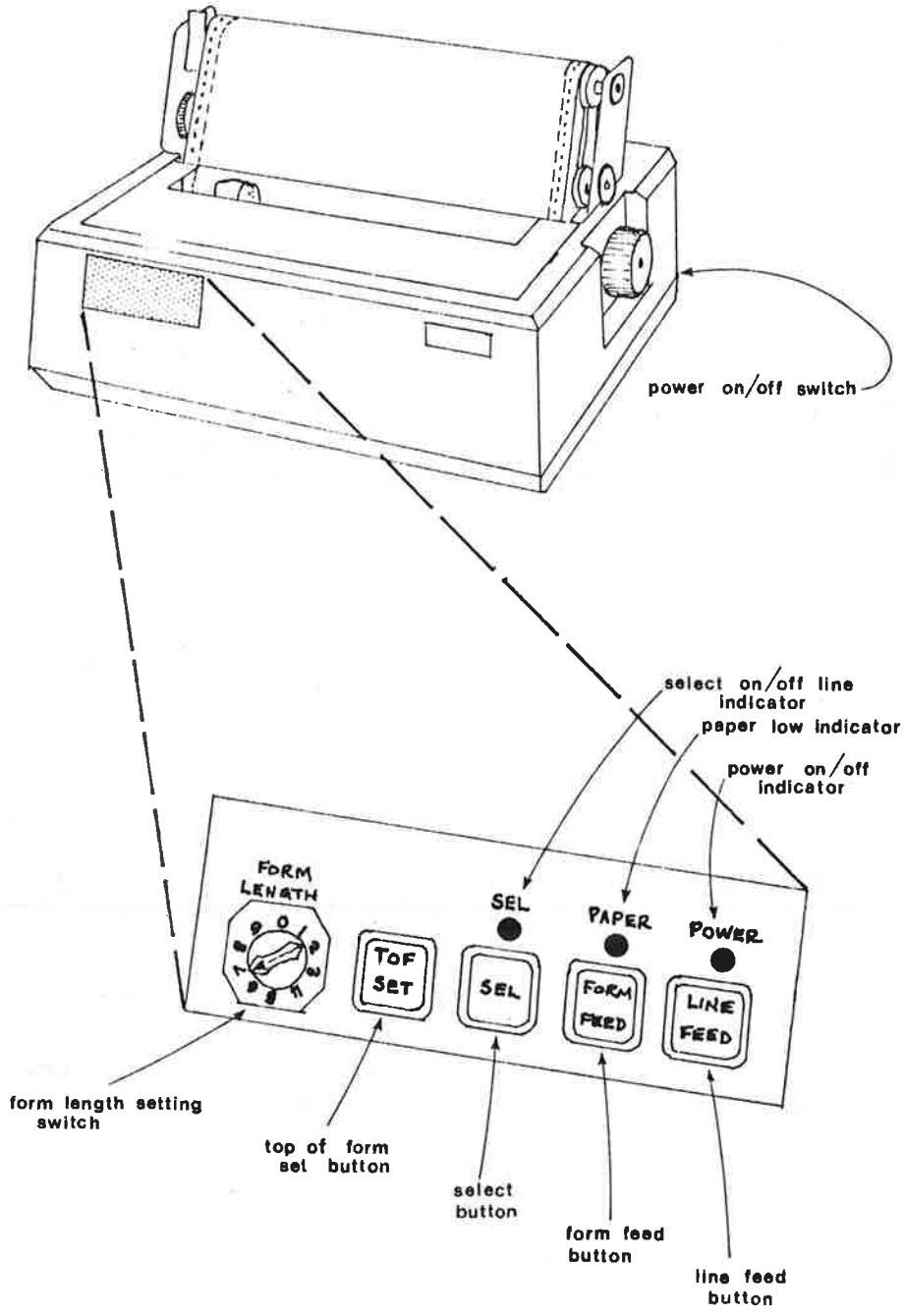

Figure 21 Oki printer (Okidata microline 82A)

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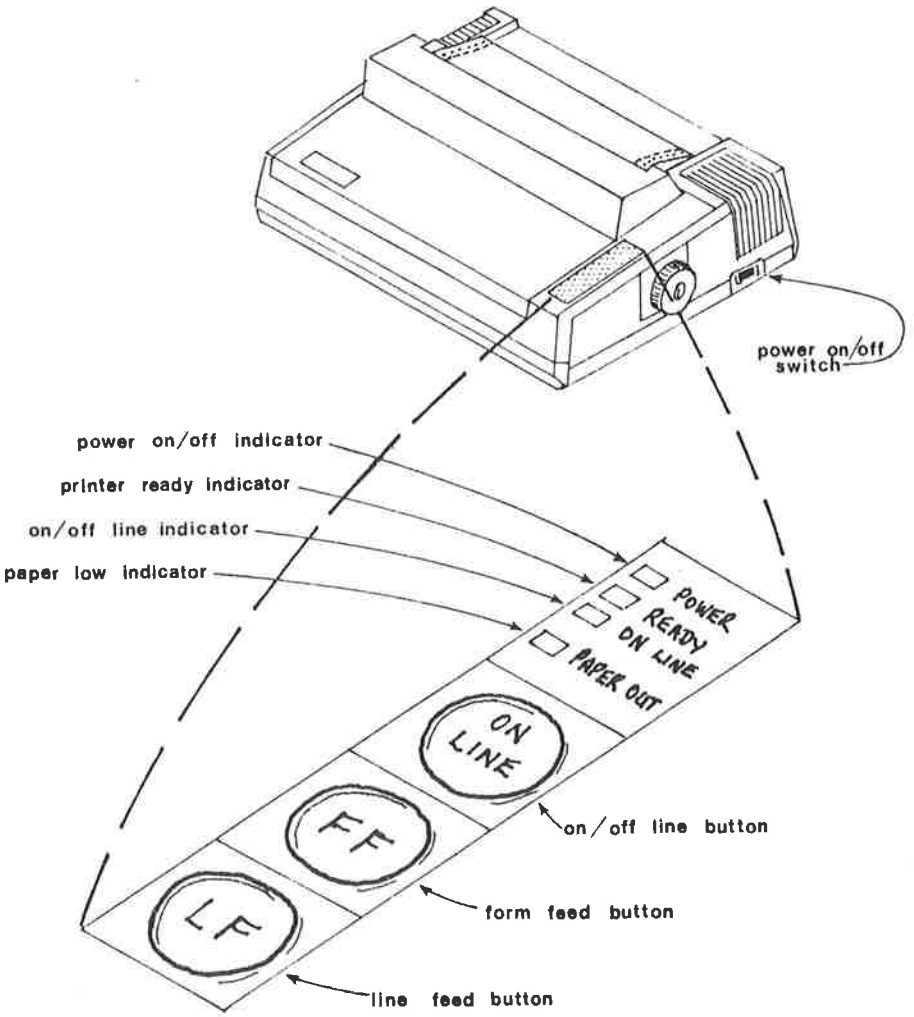

Figure 22 Star printer (Star DP510)

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The **PAPER** or **PAPER OUT** light which glows to warn you that the printer has run out of paper. For instructions on how to load the paper, refer to the manual provided with the printer.

When loading a new box of paper, you may have to set the paper position. It is usual to position the print head just below the perforation, which is achieved by winding the knob on the side of the paper roller. The Oki has an extra button, **TOF**, which you press after you have moved the paper to tell the printer that the paper is set to the Top of Form.

The Oki also has a **FORM LENGTH** dial which is used to make adjustments for the varying lengths of paper which are available. The paper normally supplied with this printer is LENGTH 7. If the FORM LENGTH dial is not set to this, correct it and set TOF as above.

2.3 PLOTTERS

MWD uses two makes of plotter, the Watanabe and the Iwatsu, both of which operate in the same way. Figure 23 shows the Watanabe plotter.

Remember to switch the Iwatsu on before switching on the ALTOS.

Before the plotter is switched on, the pen may be moved manually to the start position in the bottom left-hand corner of the machine. Position a sheet of A3 paper under the plotting arm within the frame made by the lines inscribed on the plotter bed, and secure it using the magnetic metal strips. Mount a fine tipped felt-tip pen into the pen holder, about 1.5 mm above the paper.

Once the plotter is switched on, the **POWER** light will shine. The pen may now only be moved by pressing the key marked with the appropriate directional arrow. Use the **PEN UP** control to raise the pen if it has been left in the down position. For the Watanabe only, this control must be down for plotting, even though the pen may actually be up!

Note: the plotter will not start until the pen is in the start position.

The **ALARM** indicator light comes on whenever the ALTOS sends commands that would cause the pen to move outside the plotter limits. This can occur if the overall size of the plot is bigger than the plotter limits.

Caution: Do not put floppy disks on the plotter bed because it is magnetised and will destroy data stored on the disk.

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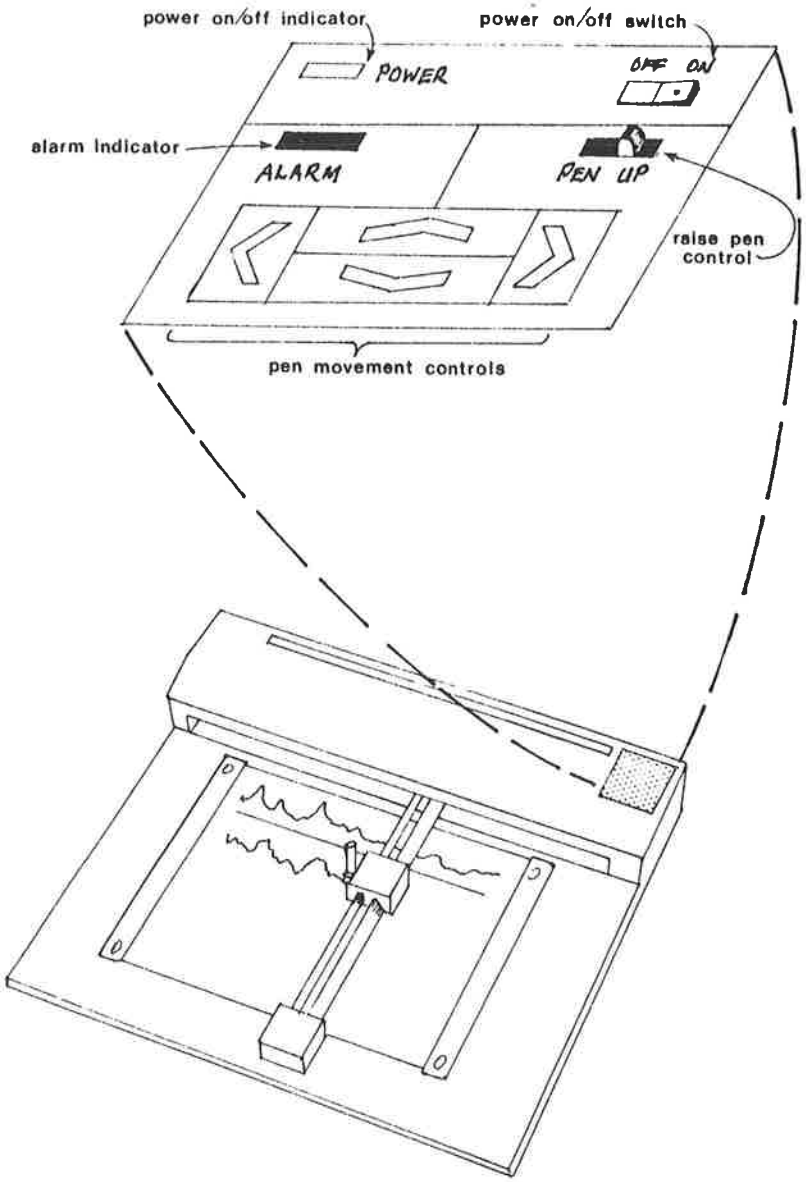

Figure 23 Watanabe plotter

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2.4 PAPER-TAPE READER

MWD uses a standard Enviro-Labs 16-track paper-tape reader, which has been modified to provide computer control to increase the reliability of readings. The selector box has to be switched to the tape reader before use (see figure 19).

2.4.1 Front Panel Controls

An illustration of the front panel appears in figure 24.

ON/OFF SWITCH When the power to the reader is on, the lamp above the switch is illuminated. If the lamp fails to glow, check that the reader is plugged in!

REV/FWD SWITCH Paper movement is regulated by a stepping motor located to the left of the read head. This switch controls the stepping motor direction and hence the direction of the paper feed. The take-up spool motor only works when the stepping motor is running forwards.

GENERAL CLEAR This button is pressed to initiate a new operation. It is usually pressed to start the reader or to tell it that the mode of control has been changed, see Manual/Auto Switch.

8CH/16CH SWITCH This switch can be ignored because it is not connected to anything!

DISPLAY TEST When this button is pressed, the display should show 8888. If it doesn't, return the reader to WSISC for servicing.

MANUAL/AUTO This switch sets the mode of control. When set to **MANUAL**, the tape can be read directly by the user and positioned using the Paper Advance/Step switch. When the switch is set to **AUTO**, the reader can be controlled by the computer. The position of this switch is read by the computer only when the General Clear button is pressed, and so to change modes press the Manual/Auto switch, followed immediately by the General Clear button.

PAPER ADVANCE/STEP This three-position switch controls the speed of the reader. When the switch is in its central position, the reader operates at maximum speed. If it is raised to the Paper Advance position, the speed may be reduced and controlled by the frame rate knob. The slower speeds are useful for reading torn tapes. The step function can only be used in the manual mode and will move the tape to the next reading.

DISPLAY TIME This knob controls the duration of a manual reading. As this function is rarely used, leave the knob in the fully anti-clockwise and locked position.

Publication no. 5 of the Hydrology Centre, Chriistchurch (1985)

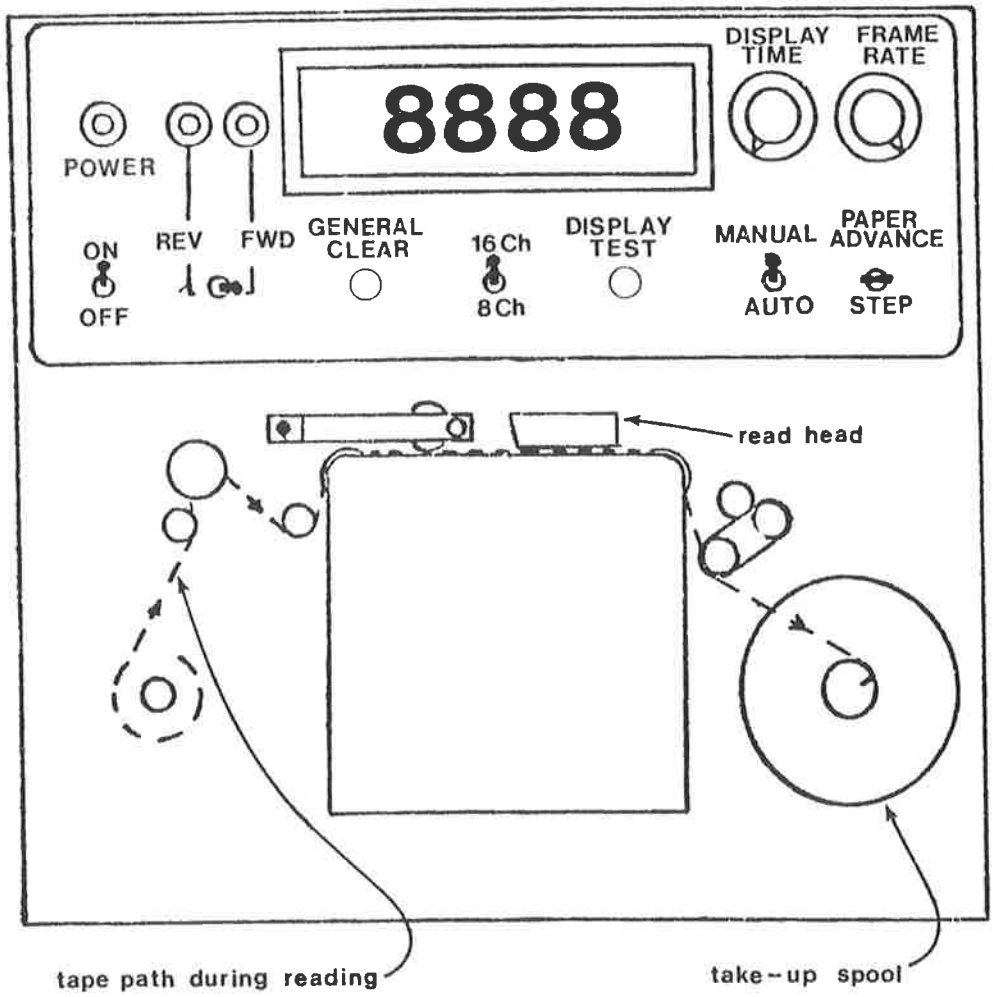


Figure 24 Enviro-Labs 16-track paper tape reader

FRAME RATE After raising the Paper Advance switch, use the frame rate control to adjust the speed of the reader. When the reader is under automatic control, the frame rate must not be adjusted while the tape is moving.

2.4.2 Manual Operation

The facilities provided under manual control were designed by Enviro-Labs to allow a user to read a tape and write down the values. Load the tape and select Manual mode by setting the mode switch and pressing General Clear. Each time the Step switch is pressed the tape will advance one reading and the value will be displayed. By turning the Display Time knob

Publication no. 5 of the Hydrology Centre, Chriistchurch (1985)

clockwise you can adjust the duration of a reading, with the tape advancing one reading at a time with a controlled delay in between. Readings that are of no interest can be skipped by raising the Paper Advance switch, which allows the tape to move continuously at a speed determined by the position of the Frame Rate knob.

2.4.3 Automatic Operation

To operate the reader under computer control, set the mode switch to Auto and then press General Clear. The tape direction switch must be set to forward and the Paper Advance switch must be in its central position. Raising this switch gives variable tape speed, but the switch must not be adjusted once the tape is moving.

2.4.4 Threading the Tape

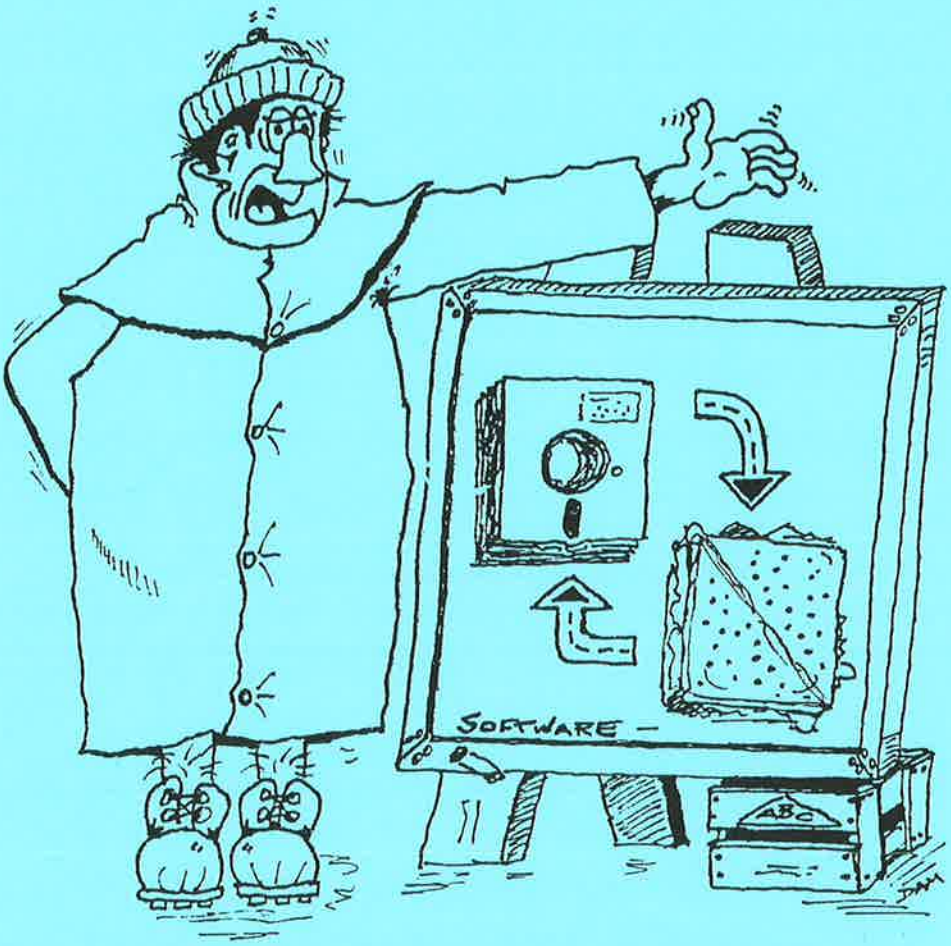
Because threading the tape incorrectly will introduce translation errors, the standard procedure shown in figure 24 **MUST** be adhered to.

2.4.5 Rewinding the Tape

The take-up spool motor can be used to rewind the tape. Set the tape direction switch to forward and load the tape so that it runs through the left-hand guide, then over the top of the read head. Set the mode to Manual and press General Clear. When the tape is rewound, switch to Auto and press General Clear to stop the spool motor.

Publication no. 5 of the Hydrology Centre, Chriistchurch (1985)

SOFTWARE



" KNOW THE DIFFERENCE AT LUNCH-TIME !! "

Publication no. 5 of the Hydrology Centre, Chriistchurch (1985)

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SECTION 3 SOFTWARE

This section provides the first-time computer user with a brief introduction to the CP/M operating system, micro-TIDEDA and the proprietary software packages WORDMASTER and DATASTAR. Discussion is limited to a basic introduction to the facilities available in these programs, and a more detailed description of how to use those that are necessary for the day to day EDP operations of the field parties.

3.1 THE CP/M OPERATING SYSTEM

An operating system is software which allows a microcomputer to control its peripherals and so communicate with the user. The operating system in use on the ALTOS is called CP/M, the name being an acronym for Control Program for Microprocessors. When the prompt A> (or B>) appears on the screen, it indicates that CP/M is ready to receive commands from the user. The first word of a command is taken as the name of a program stored on floppy disk, and when you issue a command to CP/M, it will execute the program. If you require further details, refer to Digital Research Corporation (1978) "Introduction to CP/M Features and Facilities".

3.1.1 The Working Drive

The Working Drive is identified by the CP/M prompt. When A> appears, the Working Drive is A, and when B>, it is B. Drives are referred to as a letter, followed immediately by a colon. All files mentioned without a specific drive name are assumed to be on the Working Drive, and can be obtained by simply typing the file name, for example:

```
A>PIP<cr>
```

If the Working Drive is A, and you wish to run the program PIP which is on Drive B, you must tell the computer to look for it on Drive B by typing:

```
A>B:PIP<cr>
```

or change the Working Drive by typing:

```
A>B:<cr>
B>PIP<cr>
```

Because CP/M can execute a program from either drive, you do not need to have copies of programs on your WORKING Disk: so keep all programs on a PROGRAM Disk.

Publication no. 5 of the Hydrology Centre, Chriistchurch (1985)

3.1.2 Files and File Names

Programs and collections of data on the disk are called files, and each file must have a different file name. The same file name can be used for different files on different disks without confusing the operating system, since it automatically adds the Drive name to it. Thus, for example, the file TIDEDA.001 on Drive A is recognised as A:TIDEDA.001, while a file of the same name on Drive B is recognised as B:TIDEDA.001.

File names consist of three parts: an optional drive name, a main name and an extension. The drive name does not have to be specified unless you are requesting a file from, or creating a file on, a drive other than the Working Drive. The main name can be made up of one to eight characters. The extension, which is also optional, is generally used to identify the type of file, and consists of a dot followed by up to three characters. The following file names are all valid:

```
B:TIDEDA.001
TIDE.TXT
TIE
```

A file can have any extension, but the extensions listed in table 2 are normally reserved for the stated type of file.

Table 2 Commonly used file name extensions

Extension	File Type
.BAK	Backup file created by the text editor, WORDMASTER
.BAS	BASIC language source program
.COM	Compiled program
.DEF	Defines the format of each record in a .DTA file
.DTA	File of text data written by a data entry program
.ED	File of text data written by micro-TIDEDA
.NDX	Index to a .DTA file
.001	No.1 micro-TIDEDA file
.$$$	Temporary file
.100	Temporary micro-TIDEDA file

Publication no. 5 of the Hydrology Centre, Chriistchurch (1985)

Temporary files are usually deleted by the same program that created them, therefore you would not normally see them on a directory listing. To avoid losing information, you should never create a file which has .$$$ or .100 as its extension. Any program with the extension .COM (i.e., a compiled program) can be run just by typing its name followed by <cr>. Thus, the program PIP.COM can be run by typing:

```
A>PIP<cr>
```

3.1.3 Wildcards

Wildcards are a way of referring to more than one file in a single statement. Two special characters are used: the asterisk, which stands for any whole main name or any whole extension; and the question mark, which stands for any single character. Therefore, all files on Drive B can be referred to as:

```
B:*.*   or   B:????????.???
```

All files on the Working Drive with the main name RAIN can be referred to as:

```
RAIN.*
```

and those with the extension .BAK as:

```
*.BAK
```

All files on the Working Drive starting with the letters TI and having the extension .DAT can be referred to as:

```
TI??????.DAT
```

3.1.4 Initialising a New Disk

Before a disk can be used, it must be **FORMATTED** so that it can be read by the ALTOS. Place the PROGRAM Disk in Drive A and the disk to be formatted in Drive B, and type:

```
A>REFORM<cr>
```

Select option 5 (Double Density Format) from the menu given by typing:

```
5<cr>
```

When the formatting is done, the menu will be displayed again. To return to the CP/M system, select option 8 by typing:

```
8<cr>
```


Publication no. 5 of the Hydrology Centre, Chriistchurch (1985)

Note: the REFORM command removes all files previously stored on the disk.

So that your disk will be able to execute CP/M commands, the next step is to type:

```
A>SYSGEN<cr>
```

ignore the menu, and simply type:

```
A<cr>B<cr><cr>
```

and your disk is now ready for use. If you want to be able to "boot" off your new disk, copy across CBIOS64.COM by typing:

```
A>PIP B:=A:CBIOS64.COM<cr>
```

3.1.5 CP/M Commands

CP/M offers a variety of facilities for file management. The descriptions given below will allow you to carry out straightforward and commonly required operations. For a full description of each facility refer to Digital Research Corporation (1978) "Introduction to CP/M Features and Facilities".

Before describing the CP/M commands, there are three uses of the CTRL key (written ^) which you will find helpful when using these and other programs. Remember, when using the CTRL key it must be held down while you press the required letter key.

CTRL S (^S) will Stop whatever is displaying on the screen from scrolling and holds it there. A second ^S will Start it scrolling again.

CTRL P (^P) allows you to Print whatever is displayed on the screen Press ^P to lock the printer in before pressing the <cr> to execute another command. Once you have locked the printer in, anything you bring up on the screen will also be printed. A second ^P is necessary to release the printer again. For ^P to work, the printer must be attached, switched on, and ON LINE (see pages 35-38).

CTRL C (^C) can be used at any time to Cancel whatever program or function you are using and return you directly to the CP/M system. This has no disastrous effects, and is the usual way to stop something that has got out of hand: it is called a WARM BOOT. The CP/M prompt A> (or B>) should appear after a ^C.

Publication no. 5 of the Hydrology Centre, Chriistchurch (1985)

The following examples of CP/M commands are set out exactly the way the computer expects to see them. Therefore, when you come to use them on your files substitute your file names and the appropriate drive name, but do not change the order, spacing or punctuation.

DIR gives a DIRectory of all the files on the disk in the named drive. By typing:

```
A>DIR B:<cr>
```

you will display on the screen a list of all the files on Drive B, which is normally the drive in which you will have your WORKING Disk.

ERA will ERAse the named file. Until you become familiar with the system it is advisable to specify the drive, file name and extension. By typing:

```
A>ERA B:RUBBISH.TXT<cr>
```

you will erase the file RUBBISH.TXT on Drive B and the disk space previously occupied by it will be available for re-use. As you become more confident you can speed things up by using wildcards, although they should only be used with extreme caution. An example using wildcards is:

```
A>ERA B:*.TXT
```

which will erase **ALL** files with the extension .TXT on Drive B. Thus, you can see how much damage you can do if you use wildcards without due care.

PIP, which stands for Peripheral Interchange Program, has many uses; its principal use is to copy files. It is good practice to keep backup copies of all your current files on a separate disk, in case some disaster befalls your WORKING Disk (e.g., you spill your coffee on it). To copy a file from one drive to another and retain the same name, you must first specify the destination drive (the one you want to copy to) followed by the source drive (the one you want to copy from) and the name of the file on that drive. Typing:

```
A>PIP B:=A:XYZ.DTA<cr>
```

will copy all the data in file XYZ.DTA which is on Drive A to a file of the same name on Drive B. You will now have two copies of the same file on two separate disks. If you receive a "disk write error" message on the VDU, it means that the destination disk is full. Before copying the file again, you will have to erase some other files to make room.

Publication no. 5 of the Hydrology Centre, Chriistchurch (1985)

REN is used to RENname a file on the same disk. You must specify the drive, then give the new name, followed by the old name. Typing:

```
A>REN B:RAIN.TXT=XYZ.DTA<cr>
```

will change the name of the file on Drive B from XYZ.DTA to RAIN.TXT.

STAT gives STATistical information about the size of files and the amount of space left on the disk in the specified drive. Disks have approximately 450k of user storage space. So, to ensure that there is enough room left on your disk to file your data, type:

```
A>STAT B:*.*<cr>
```

which will give details of every file on Drive B, and tell you how much space is left on the disk.

TYPE lists the contents of the named file on the screen. If the file is not one containing printable characters (e.g., a file with the extension .COM), nonsense will appear on the screen. Type:

```
A>TYPE B:XYZ.DTA<cr>
```

and the contents of XYZ.DTA will start scrolling on the screen. You can use ^S to keep stopping and starting the scrolling until you have read the whole file, or all you want.

You can also print the file as long as you alert the printer first by pressing ^P before pressing the <cr> which starts the scrolling. As soon as <cr> is pressed, the information will scroll up the screen and at the same time the printer will be copying it all out. Don't forget to release the printer again by pressing ^P.

3.1.6 Maintenance Programs

Two file maintenance programs are supplied with the PROGRAM Disk:

CPCOPY allows you to copy the entire contents of one disk to another. Insert the PROGRAM Disk in Drive A, and a disk to copy to in Drive B. Type:

```
A>CPCOPY<cr>
```

The program tells you what to do: replace the PROGRAM Disk with the disk to copy from, and follow instructions. Use this program to make backups of entire disks.

Caution: This program over-writes everything that was previously on the disk, so check that you have got your disks round the right way.

Publication no. 5 of the Hydrology Centre, Chriistchurch (1985)

WOF runs a "warrant of fitness" program which checks that all tracks on the disk in Drive B are in a fit state for use. With the PROGRAM Disk in Drive A and your disk in B type:

```
A>WOF<cr>
```

and follow the instructions given.

If the WOF program indicates bad sectors on the disk, it may be that the disk is worn out or the disk drive is dirty. To check the latter, remove the disk and blow lightly into the disk drive, or insert a cleaning disk (if available). Re-insert the original disk and repeat the WOF. If the same sectors are still bad, chances are that the disk is worn out and should be discarded. To salvage what you can from the disk, use PIP to individually copy across each file to a new disk. You will not generally be able to copy across files that cover bad sectors, and these will have to be reloaded from your backup disk.

3.2 micro-TIDEDA

Micro-TIDEDA is a computer program for processing time-dependent data, particularly hydrological data. MWD has developed it from their mainframe computer software TIDEDA to run on microcomputers with floppy disks. The software can be used to collect, edit, store, display, and analyse the information it is given. In this way, field parties can both process and correct data virtually at the point of its collection. It is also used for initial entry of data destined for the VCC mainframe archive.

Micro-TIDEDA deals with data that are naturally recorded as a time sequence (e.g., rainfall and stream flows). The program accepts data from a variety of automatic recording instruments and stores it in a form designed to facilitate checking, correcting and analysis.

Among the many features available in micro-TIDEDA are:

(a) processes providing general statistical summaries, including plots, printouts and tabulations of means, extremes and totals, computed for daily, weekly, monthly, seasonal and annual periods;

(b) processes allowing direct data entry from a 16-track paper-tape reader, keyboard or a suitably formatted disk file;

(c) processes allowing the correction, storage and deletion of data, the manipulation of files and batches, and the efficient use of space on disks;

Publication no. 5 of the Hydrology Centre, Chriistchurch (1985)

(d) processes controlling the software's operating environment, which specify the disk files to be processed and enable the user to carry out a succession of pre-defined tasks which can then be run without further intervention on his/her part.

3.2.1 Using micro-TIDEDA

To start up micro-TIDEDA, place the PROGRAM Disk in Drive A and your WORKING Disk in Drive B. Press the RESET button on the disk drive unit (see figure 19) to alert the CP/M system, and when the prompt A> appears, type:

```
A>TIDEDA<cr>
```

Micro-TIDEDA will sign-on and ask for the name of the disk drive which contains your DATA file.

```
Welcome to WOOD-MOUSE TIDEDA
Which disk drive has your data [B] :-<cr>
```

Pressing the return key will let it know you want the drive shown in brackets (i.e., drive B). Micro-TIDEDA now reads the directory from your DATA file (in this example B:TIDEDA.001), and asks for a command by issuing the prompt:

```
Which Process:-
```

When this message appears, type the name of the process you wish to use. For example, to exit micro-TIDEDA, type END<cr> when the prompt appears:

```
Which Process:- END<cr>
```

The program responds with:

```
Thank you for flying WOOD-MOUSE Airlines
A>
```

Figure 25 illustrates the processes available in micro-TIDEDA and how they relate to each other

When micro-TIDEDA is checking any command you enter, only the first four letters are needed. You may enter more than four and the extra ones will be ignored; or you may enter less, provided there are enough to uniquely define the process you require. If you receive a message such as "Ambiguous Command", it means that you did not type enough letters.

Each facility available in micro-TIDEDA is called a PROCESS and those relevant to field party operations are listed below, with a brief

Publication no. 5 of the Hydrology Centre, Chriistchurch (1985)

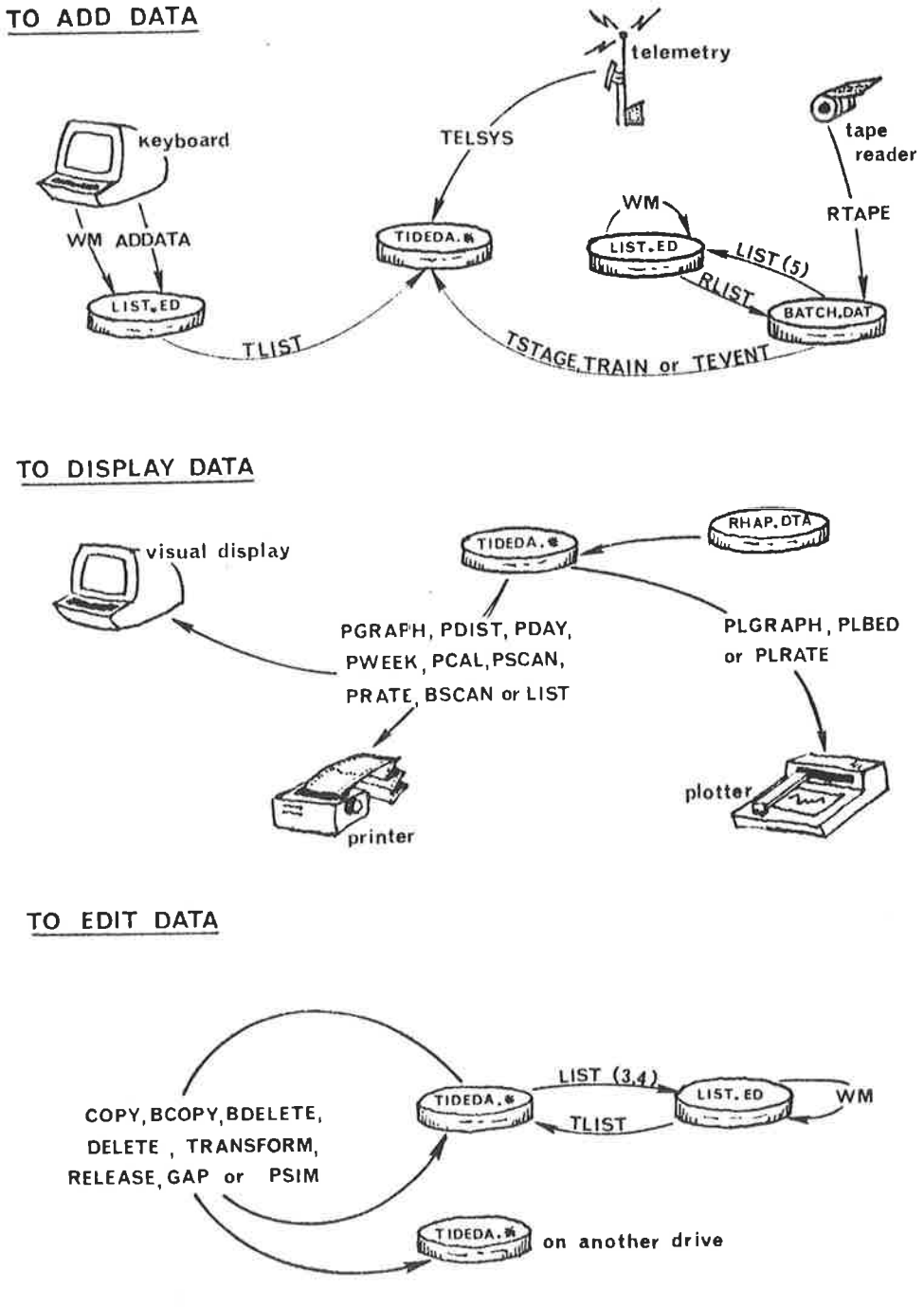


Figure 25 micro-TIDEDA processes

Publication no. 5 of the Hydrology Centre, Chriistchurch (1985)

description of their function. For a full list of processes and details of their operation refer to Thompson and Rodgers (1985) "Micro-TIDEDA User's Manual". (Unless otherwise indicated, all processes referred to in this handbook are from micro-TIDEDA and have not been individually referenced.)

Processes for Data Entry

RTAPE	translates 16-track paper-tape data into the translator buffer.
TSTAGE	transforms stage data in the buffer into TIDEDA format and adds it to the file.
TRAIN	transforms event rainfall data in the buffer into TIDEDA format and adds it to the file.
TEVENT	transforms event stage data in the buffer into TIDEDA format and adds it to the file.
ADDATA	allows manual entry of series data and ratings to a list file.
TLIST	merges data from a list file on to the TIDEDA file.

Processes for File Management

COPY	copies specified data from one file to another.
BCOPY	copies a specified batch of data from one file to another.
SELECT	copies specified data from one site to another.
DELETE	deletes specified data.
BDELETE	deletes a specified batch of data.
GAP	removes "gap" markers at the start of batches, enabling the joining together of consecutive batches of data.
RELEASE	removes obsolete data which has been revised, releasing the space for reuse.
BSCAN	gives a summary of batches on the file.
LIST	allows the listing of, or writing to a dataset for editing specified data.
RLIST	allows the listing of, or writing of the translator buffer to an editing dataset.
RESET	must be used when a new DATA Disk is inserted in Drive B.
END	gets you out of micro-TIDEDA and back to the CP/M system.

Processes for the Display of Data

PSCAN	prints a summary of data on file in site order.
PDAY	prints tabulations of daily means or totals.
PCAL	prints tabulations of monthly means or totals.
PDIST	prints a distribution tabulation.
PWEEK	prints tabulations of daily, weekly, monthly, annual and seasonal values.
PRATE	prints a tabulation of a rating.
PGRAPH	print plots specified time/series data.

Publication no. 5 of the Hydrology Centre, Chriistchurch (1985)

PLGRAPH	line plots specified time/series data at given axes dimensions.
PLRATE	line plots specified ratings at given axes dimensions.
PLBED	plots the difference between the measured stage and the computed stage for a given flow against time.

Processes for Data Manipulation

PSIM	performs calculations on a time series and writes the results as another time series.
TRANSFORM	copies specified data from one file to another. In so doing, you can change its site number, apply ratings and linear transformations, or transform it into equal steps in time, as required.

3.3 PROPRIETARY PROGRAMS

To facilitate the use of micro-TIDEDA, two proprietary programs, WORDMASTER and DATASTAR, are also supplied to field parties on the PROGRAM Disk.

3.3.1 WORDMASTER

WORDMASTER is a software package for use in editing data during initial processing. This section describes only those functions which will be of use to field party operations. For details of the software and instructions on how to use it see MicroPro International Corporation (1980) "WORDMASTER Operator's Guide".

To get into WORDMASTER, type WM after the CP/M prompt and the name of the file you wish to edit. If the file is on your WORKING Disk, don't forget to type the drive name before the file name. Thus, type:

```
A>WM B:LIST.ED<cr>
```

and the first part of your file will appear on the VDU screen, after a brief pause during which the program's copyright message is displayed.

To correct errors by over-typing the wrong characters with the right ones, move the cursor to the appropriate point, using the following commands:

```
^E - up a line
^X - down a line
^D - right a character
^S - left a character
^F - right a word
^A - left a word
```

and simply type in the correct information.

Publication no. 5 of the Hydrology Centre, Chriistchurch (1985)

To cover more ground:

^C - scrolls up a full screen (to read forwards through the file)
^R - scrolls down a full screen (to read backwards through the file)

To delete a string of incorrect characters, position the cursor on the first character and type ^G to remove it; successive deletions to the right will occur with each use of ^G. Use ^T to delete whole words under and to the right of the cursor. To delete a whole line, use ^Y - caution must be exercised though, as all data between carriage returns will be lost using this command.

To insert new characters, and at the same time retain that which is already there, move the cursor to the point where the new data starts, type ^O and the cursor will be shown overlaying a < sign (called the insert toggle), which obscures the character beneath. Type the new data in, when finished, type ^O again to release the insert toggle.

All the above commands operate while the program is in video mode (i.e., you can see what you're doing as you do it). WORDMASTER automatically enters the video mode when you start the program. The following search and replace commands operate in the command mode, which is achieved by pressing the **ESCAPE** key. An asterisk * appears at the bottom of the screen indicating that the program is ready to accept your next command.

To find a particular string of characters, first type ESCAPE. When the * appears at the bottom of the screen, type:

```
*Fstring to find$V<cr>
```

The cursor will appear immediately after the last character of the stated string.

Note: the $, which delineates the string, is obtained by typing ESCAPE after typing in the exact duplicate of the string to be found. The V puts you back into video mode so you can see what you've got.

To replace a string with another string, type ESCAPE. When the * appears at the bottom of the screen, type:

```
*Sold string$new string$V<cr>
```

The change will be made and the cursor will appear at the end of the change. If there is more than one substitution to be made, prefix the command with the number of occurrences or a number larger than the possible occurrence. Thus,

```
*999Sold string$new string$V<cr>
```


Publication no. 5 of the Hydrology Centre, Chriistchurch (1985)

WORDMASTER actions all commands from the current cursor position to the end of the file. Therefore, you must either return to the beginning of the file each time by typing ESCAPE and then **B<cr>** after the *, or precede your command with - (i.e., minus), thus

```
*-999Sold string$new string$V<cr>
```

will correct all the occurrences of the old string from the current cursor position back to the start of the file.

Once you have finished your editing session, type ESCAPE. When the * appears at the bottom of the screen, type **E** (to exit and save) and you will be returned to the CP/M system. If you want to save what you've already done (so that you won't lose too much if there's a power-cut, for example), type **S**. Your editing will be saved, and you will be returned to the beginning of the file. If, however, you discover that you've been editing the wrong file, or have completely messed up the right one, simply type **Q** (to quit). The program will ask you if you want to abandon, type **Y** and you will be returned to the CP/M system, with the original file intact (i.e., the way it was before you began your editing session).

3.3.2 DATASTAR

DATASTAR is a software package which provides field parties with a facility for entering text to make comments about data filed using micro-TIDEDA. It uses a pre-set blank form for each record, which the user fills in with the appropriate information. The forms used by the field parties have been created by the QAS, using the associated FORMGEN program.

To use DATASTAR, with the PROGRAM Disk in Drive A and your WORKING Disk in Drive B, type DATASTAR after the CP/M prompt A>, and the name of the required form, preceded by the drive name B:. Thus

```
A>DATASTAR B:COMMENT<cr>
```

After the copyright message you will be asked which drive to file .DTA and .NDX on: respond with B to both. The first blank form will appear, above which are listed the mode options. Press the **space bar** to enter the **ADD** mode, and start filling in the form.

The program is menu assisted and the necessary cursor commands etc., can be read directly from the menu which appears at the top of the form (note the similarity with WORDMASTER). When the form is completed, type **^B<cr>** to file the data, and a new blank form will appear ready for the next record entry. After the last form has been filled in and filed, to exit from DATASTAR type **^E E ^C**, which returns you to the CP/M system.

Information filed on DATASTAR can also be edited. If your file is not very long it will be as easy to select either the scan by **INDEX** order (by

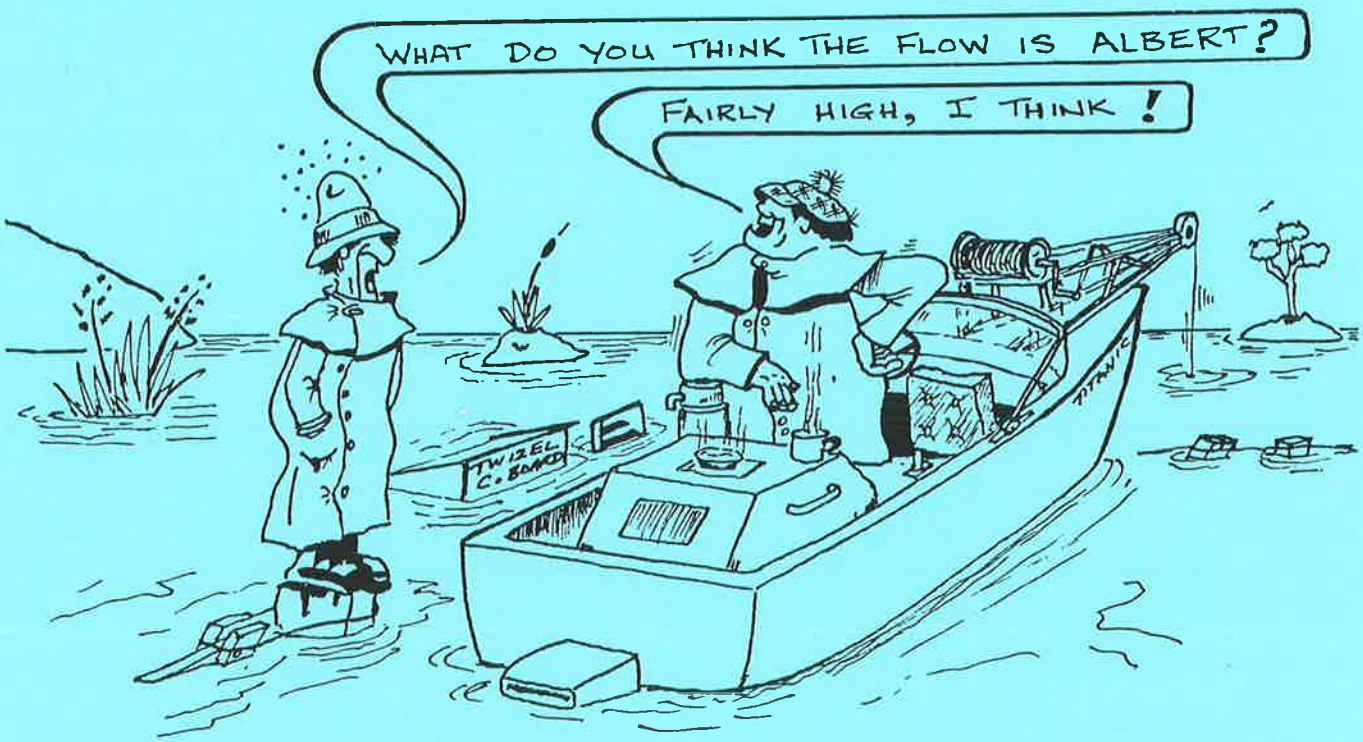
Publication no. 5 of the Hydrology Centre, Chriistchurch (1985)

typing **I**) or **DATA** order (by typing **D**) options from the mode selection menu. When the first record appears, use **^N** to scan through the file until you come to the record you wish to correct. The menu at the top of the form will give you the commands necessary to edit the record. When the record is corrected, type **^B<cr>** to file the updated version, and carry on scanning using **^N** (to search forward) or **^P** (to search backward). For larger files, it is quicker to select the relevant records individually, using the **KEY** mode, which searches the file on the key field. Type **K** to select the mode, and a blank form will appear with the cursor resting in the key field. Type in the relevant key to bring up the required record. Make the corrections and save as before. You will be returned to the blank form with the cursor on the key field, ready to select the next record. In all modes, after the last form has been corrected and filed, to exit from DATASTAR type **^E E ^C**, which returns you to the CP/M system.

For more information on the modes and operations of DATASTAR and FORMGEN refer to MicroPro International Corporation (1982) "DATASTAR Training Guide".

Publication no. 5 of the Hydrology Centre, Chriistchurch (1985)

FLOW REPORTS



Publication no. 5 of the Hydrology Centre, Chriistchurch (1985)

Publication no. 5 of the Hydrology Centre, Chriistchurch (1985)

SECTION 4 FLOW REPORTS

Flow reports present a river flow record with a description of the stage/flow ratings used and of the best available correlation with the catchment's rainfall record.

The objectives of a flow report are to:

(a) present useful data tabulations and statistics for a flow site;

(b) present evidence of the reliability of the statistics given.

Preparation of a flow report should not begin until the water level data have been certified (see page 30). This implies that the water level data have been checked for errors and any necessary corrections carried out, or where this is not possible suitable data comments cover whatever action has seemed most appropriate.

Two forms of "evidence" are presented in a flow report that show the reliability of both the rating curves and the combination of rating curves and water level records. While the former demonstration, by bed plots, is independent of the water level record, the latter demonstration is not, and can reveal hidden trends in the data.

4.1 CONTENTS OF FLOW REPORTS

(1) Title page to identify the station and author. It should contain:

(a) station name;
(b) station number;
(c) period covered by the report;
(d) year submitted;
(e) author and author's location; this is necessary for future correspondence concerning data contained in the report.

(2) Table of contents.

(3) Simple catchment map to enable the reader to identify with the catchment and its location. The map should show:

(a) flow sites;
(b) raingauges;
(c) scale bar;
(d) north point;
(e) some reference to location (e.g., town, SH, etc.);
(f) other features relevant to the catchment.

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(4) Introduction which should help the reader identify with the station. It also lists the work carried out in preparing a rainfall/runoff correlation, which is important for the appraisal of the report by the reader. The introduction should contain:

   (a) brief description of the catchment;

   (b) notes of any problems encountered in preparing the report (e.g., lack of suitable rainfall information, etc.);

   (c) notes of interest on the tabulated data; attention should be drawn to the data comments if the data have any noteworthy events (e.g., prolonged periods of synthetic record, etc.);

   (d) a full description of the derivation of index rainfall used in the cumulative mass curve analyses.

(5) Correlative Stations: It is important to identify stations that can be used to fill gaps in records if a user wants a continuous record. Therefore, this section should include results of any statistical correlation carried out between sites in the course of the flow report investigation. Both flow and rainfall stations should be presented, and an indication of whether they are useful for long-term correlation, or just storm or drought correlations.

(6) References (if any).

Sections 1 to 6 are only guidelines for the contents of the report leading up to the computer tabulations. For example, some flow reports may require more discussion on station problems. It is up to the author to include as much catchment information in the report as is necessary to fully interpret the data presented in it.

(7) Tables of monthly flows.

(8) Tables of extreme flows.

(9) Flow hydrographs.

(10) Tables of flow distributions.

(11) Bed plots.

(12) Plot of rated flow against gauged flow.

(13) Flow rating curves.

(14) Flow rating tables.

(15) Data comments.

Publication no. 5 of the Hydrology Centre, Chriistchurch (1985)

(16) Cumulative mass curves.

(17) Table of index rainfall used in the rainfall/runoff cumulative mass curves.

(18) Tables of daily flows.

The tables of monthly flows (7), extreme flows (8), flow distributions (10), monthly rainfall used in rainfall/runoff cumulative mass curves (17), and daily flows (18), as well as flow hydrographs (9), provide a summary of useful and commonly required statistics.

The data comments (15) and flow rating curves and tables (13) and (14) provide additional information on the computerised data. A sample of rating curves helps in the interpretation of the cross-section shape.

The bed plots (11), plot of rated flows against gauged flows (12) and cumulative mass curves (16) give evidence that the data have been checked and are in order.

4.2 COMPLETION PROCEDURES

All flow reports should be preared on A4 size paper for ease of copying and filing.

The draft flow report will be given a Flow Report Series Number when it is submitted to the QAS. After review and necessary revision to meet quality assurance standards, the report will be added to the Index of Flow Reports, and can then be supplied from any MWD office on an unrestricted basis. The master copy is to be held at the field office.

At intervals of not more than five years, a new flow report should be prepared containing all the data for the full length of record for each station. The new flow report then totally supersedes any previous flow reports for the same station. However, references to all earlier flow reports for the station should be given.

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SECTION 5 REFERENCES

Digital Research Corp. 1978: *Introduction to CP/M Features and Facilities.* Digital Research Corporation, California.

MicroPro International Corp. 1980: *WORDMASTER Operator's Guide.* MicroPro International Corporation, California.

MicroPro International Corp. 1982: *DATASTAR Training Guide.* MicroPro International Corporation, California.

MWD. 1978: *Instructions for the Preparation of River Flow Reports.* Water and Soil Directorate, MWD, Wellington.

MWD. 1982: *TIDEDA User's Manual.* Systems Laboratory, MWD, Wellington.

Thompson, S.M.; Rodgers M.W. 1985: Micro-TIDEDA User's Manual. *Publication No.4 of the Hydrology Centre, Christchurch.* MWD, Christchurch.

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